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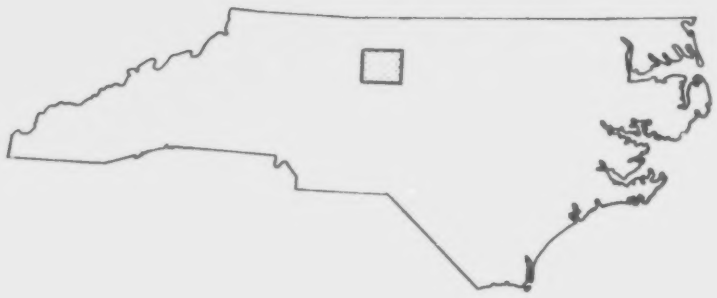
FLOOD INSURANCE STUDY

CITY OF GREENSBORO, NORTH CAROLINA

GUILFORD COUNTY



SEPTEMBER 30, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER - 375351

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

CITY OF GREENSBORO,
GUILFORD COUNTY,
NORTH CAROLINA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and supersedes a previous Flood Insurance Rate Map for the City of Greensboro, Guilford County, North Carolina (Reference 1). This information will be used by the community to update existing floodplain regulations as part of the regular phase of the National Flood Insurance Program. The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers (COE), Wilmington District, (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-84-E-1506, Project Order No. 1, Amendment 13. This study was completed in December 1985.

1.3 Coordination

On February 28, 1984, an Initial Coordination Meeting was held in the City of Greensboro Municipal Building with representatives of FEMA, the City of Greensboro, and the COE in attendance. At this meeting, the nature and purpose of the Flood Insurance Study were explained, study streams were identified, and study limits were established. The methodology to be used in this study and the floodway concept were discussed. An announcement of the initiation of the study and a request for flooding information were published in local newspapers at the outset of the study.

On December 3, 1987, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Greensboro, Guilford County, North Carolina. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of South Buffalo Creek, Twin Lakes Tributary, South Buffalo Creek Tributary A, South Buffalo Creek Tributary B, North Buffalo Creek, North Buffalo Creek Tributary A, Muddy Creek, Mile Run Creek, Ryan Creek, the East Fork Deep River, Richland Creek, Bull Run Creek, Bull Run Tributary, and Horsepen Creek was studied in detail.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through December 1990. The scope and methods of study were proposed to and agreed upon by FEMA and the City of Greensboro.

2.2 Community Description

Greensboro is an industrialized city in north-central North Carolina. It is situated in Guilford County, about 78 miles west of Raleigh, North Carolina, and 27 miles east of Winston-Salem, North Carolina, and is surrounded by the unincorporated areas of the county. Greensboro is served by Interstate 85, U.S. Highways 29 and 40, and the Norfolk Southern Railway. The 1980 population of Greensboro was reported to be 155,642 (Reference 2).

The Greensboro area was settled in the 18th century, primarily by English, Germans, and Scots. In the following years, the area enjoyed the advantages of fertile land and industrious settlers. Greensboro was originally laid out in the geographic center of Guilford County and, in 1808, succeeded Martinsville (originally called Guilford Courthouse) as the county seat. By 1858, Greensboro had become a central depot on an east-west railroad which stretched across the state, resulting in rapid development. During the 1870's and 1880's, tobacco products dominated Greensboro's industrial development. However, by 1885, four railroads served Greensboro and the city's economy began to diversify. By 1905, more than 40 new manufacturing firms were established. Major products were textiles, clay products, furniture, and wooden products such as bobbins and shuttles for textile machinery. Since 1950, with industry no longer dependent upon the railroads, manufacturing has scattered into the suburbs and continued to expand. Today, the Greensboro area is a leader in manufacturing in North Carolina. Textiles and tobacco continue to be very important to the area's economy, along with a relative newcomer, electronics.

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

APPROXIMATE SCALE

10 7 0 1 2 3 4 Miles

VICINITY MAP

Greensboro lies in the central Piedmont region of North Carolina. Hills are moderately steep with broad ridges. On the larger hills, pronounced escarpments separate uplands from stream terraces. Land elevations along the streams vary from about 700 feet to 890 feet National Geodetic Vertical Datum of 1929 (NGVD), and uplands vary from about 800 feet to 930 feet NGVD. Principal soils belong to the Enon-Mecklenburg Association, on broad, smooth, interstream divides and side slopes. These soils are gently sloping to sloping, well drained, and have sandy clay loam, clay, and clay loam subsoils. Floodplain soils are of the Chewacla-Wehadkee-Congaree Association, nearly level, well drained to poorly drained soils that have sandy loam, loam, silty loam, and silty clay loam subsoils (Reference 3).

Greensboro has a mild climate with a mean annual temperature of 58 degrees Fahrenheit and average annual precipitation of about 42 inches (Reference 3).

2.3 Principal Flood Problems

The major flooding problems in Greensboro occur along North and South Buffalo Creeks.

The largest known flood on North Buffalo Creek occurred in September 1979 in connection with a tropical storm (Reference 4). The second largest flood occurred in May 1978 (Reference 5). Flooding on North Buffalo Creek is shown in Figure 2.

The largest recorded flood on South Buffalo Creek occurred in July 1949. The gage on South Buffalo Creek was removed in 1958 so no flood levels have been recorded since that time (Reference 6). However, there have been other significant floods since 1958. Flooding on South Buffalo Creek is shown in Figure 3.

Figure 2-Flooded houses and vehicle at Latham Road and West Wendover Avenue on North Buffalo Creek during the September 8, 1977, flood.

Figure 3-Elm-Eugene Street looking south towards Ryan Creek from J.J. Drive during the September 8, 1977, flood on South Buffalo Creek.

2.4 Flood Protection Measures

Nonstructural measures of flood protection are being used to aid in the prevention of future flood damage. These are in the form of land use regulations, adopted from the Code of Federal Regulations, that control construction within areas that have a high risk of flooding (Reference 7).

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The discharges for the streams in the study area were computed using the generalized regression equations prepared for the COE, Wilmington District, (Reference 8) and techniques and procedures outlined by the U.S. Geological Survey (Reference 9). The higher discharges from these computations were used in the backwater analysis.

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
NORTH BUFFALO CREEK					
just downstream of confluence of Muddy Creek	27.10	5,050	7,110	8,300	14,900
just upstream of confluence of Muddy Creek	23.10	4,390	6,340	7,560	13,600
just downstream of confluence of North Buffalo Tributary A	8.94	2,840	4,140	4,640	7,890
just upstream of confluence of North Buffalo Tributary A	5.00	1,860	2,850	3,260	5,660
at Walker Avenue	0.91	700	1,170	1,380	2,150
MUDDY CREEK					
at mouth	3.99	1,730	2,640	3,010	4,970
at Phillips Avenue	2.57	1,420	2,180	2,520	3,860
at East Bessemer Avenue	1.73	1,230	1,890	2,180	3,080
NORTH BUFFALO CREEK TRIBUTARY A					
at mouth	3.94	1,810	2,750	3,120	4,940
at Holden Road	0.77	740	1,200	1,400	1,950
SOUTH BUFFALO CREEK					
at Asheboro Street	27.70	4,980	7,070	8,400	15,090
just downstream of confluence of Ryan Creek	20.88	4,280	6,130	7,130	12,835
just upstream of confluence of Ryan Creek	15.92	3,510	5,150	6,090	10,995
just downstream of confluence of Twin Lakes Tributary	13.11	3,340	4,900	5,440	9,830

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SOUTH BUFFALO CREEK (cont'd)					
just upstream of confluence of Twin Lakes Tributary	10.21	2,760	4,140	4,705	8,520
at Patterson Street	6.16	2,300	3,420	3,850	6,375
just downstream of confluence of South Buffalo Creek Tributary A	4.69	2,100	3,140	3,550	5,455
just upstream of confluence of South Buffalo Creek Tributary A	2.27	1,180	1,900	2,200	3,600
at Wendover Avenue	1.4	980	1,540	1,830	2,740
SOUTH BUFFALO CREEK TRIBUTARY A					
at mouth[1]	2.35	1,130	1,800	2,220	2,980
at Norfolk Southern Railway[1]	1.30	805	1,225	1,400	1,985
just downstream of Market Street[1]	1.17	765	1,150	1,330	1,810
just upstream of Market Street[1]	1.17	840	1,285	1,510	2,320
just upstream of Tower Road	0.50	510	865	1,035	1,455
SOUTH BUFFALO CREEK TRIBUTARY B					
at mouth[1]	0.65	490	850	1,050	1,530
at upper study limit	0.19	140	280	350	490
RYAN CREEK					
at mouth	4.97	1,800	2,800	3,200	5,640
at Glendale Drive	0.80	520	910	1,100	1,980
MILE RUN CREEK					
at mouth	2.53	1,300	2,040	2,370	3,830
at Randolph Avenue	2.16	1,190	1,870	2,180	3,500
at Ash Street	1.17	890	1,440	1,680	2,460

[1]discharges reduced by storage

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
TWIN LAKES TRIBUTARY					
at mouth	2.90	1,350	2,120	2,470	4,140
at Yow Road	2.25	1,280	2,000	2,300	3,580
at Holden Road	1.36	990	1,590	1,840	2,680
HORSEPEN CREEK					
at Fleming Road[2]	7.6	1,400	2,900	3,900	7,600
at Ballinger Road[2]	3.1	900	1,800	2,350	4,300
EAST FORK DEEP RIVER					
at Interstate 40[2]	4.3	1,100	2,300	3,000	5,400
RICHLAND CREEK					
at Lawndale Drive[2]	1.6	600	1,200	1,600	2,900
BULL RUN CREEK					
just downstream of confluence of Bull Run Tributary	4.1	1,010	2,100	2,800	5,025
just upstream of confluence of Bull Run Tributary	2.9	850	1,700	2,300	4,100
at Hill Top Road	1.1	500	1,000	1,280	2,400
BULL RUN TRIBUTARY					
at mouth	1.2	500	1,020	1,350	2,500

[2]the 50-, 100-, and 500-year discharge taken from the Flood Insurance Study for Guilford County

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data for streams were obtained from field surveys, as were elevation data and structural geometry on bridges, culverts, and dams. Cross sections were taken from topographic maps (References 10 and 11) at other locations when necessary.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Water-surface profiles were determined using the HEC-2 step-backwater computer program (Reference 12). Roughness coefficients for the streams were estimated from field inspection. Manning's "n" coefficients in the study area generally ranged from 0.04 to 0.07 in the main channels and from 0.07 to 0.12 in the overbank areas. The slope area method was used to calculate starting water-surface elevations for all streams.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD. Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 10 feet (Reference 13).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE) and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. The floodways for North Buffalo Creek, South Buffalo Creek, Muddy Creek, and Mile Run Creek were computed using the floodways developed for the City of Greensboro and shown on the floodway maps (Reference 14) as the minimum requirement. When a wider floodway was required to keep the surcharge within the 1.0 foot limit, the adjustment was made with the equal conveyance reduction criteria as a guideline. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and the 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
NORTH BUFFALO CREEK								
A	33,000	470[2]	5228	1.7	703.2	703.2	704.1	0.9
B	34,900	300[2]	2979	2.9	704.8	704.8	705.6	0.8
C	37,590	360[2]	3678	2.4	708.1	708.1	708.8	0.7
D	40,150	246[2]	2140	3.9	710.7	710.1	710.8	0.7
E	43,100	273[2]	2231	3.2	714.0	714.0	714.3	0.3
F	44,500	294	1810	3.9	716.0	716.0	716.2	0.2
G	46,200	289	2366	3.0	718.6	718.6	719.0	0.4
H	48,160	222	1902	3.7	720.9	720.9	721.1	0.2
I	49,620	152	1698	4.2	722.9	722.9	723.0	0.1
J	50,240	274	2130	3.3	724.3	724.3	724.5	0.2
K	50,865	283	3142	2.2	726.1	726.1	726.7	0.6
L	53,575	181	1280	4.5	729.4	729.4	729.8	0.4
M	55,007	166	1481	3.8	731.8	731.8	732.0	0.2
N	56,080	90	1123	5.1	734.0	734.0	734.1	0.1
O	57,515	200	1921	3.0	736.9	736.9	737.0	0.1
P	59,025	200	2287	2.5	738.5	738.5	738.6	0.1
Q	61,625	200	2413	2.3	741.5	741.5	741.7	0.2
R	62,870	200	2105	2.7	741.9	741.9	742.4	0.5
S	63,380	350	3348	1.7	742.5	742.5	742.9	0.4
T	65,150	500	4165	1.3	743.2	743.2	743.6	0.4
U	66,548	143	1233	4.4	743.9	743.9	744.2	0.3
V	66,850	150	1256	4.2	744.8	744.8	745.1	0.3
W	67,220	190	1271	4.2	745.3	745.8	746.0	0.2
X	68,620	200	2048	2.6	749.1	749.1	749.2	0.1
Y	69,220	200	2247	2.4	749.4	749.4	749.6	0.2
Z	70,600	200	1670	2.8	750.1	750.1	750.4	0.3

[1]FEET ABOVE MOUTH
[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

NORTH BUFFALO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
NORTH BUFFALO CREEK								
AA	71,100	200	1555	3.0	750.5	750.5	751.0	0.5
AB	71,978	123	862	5.5	751.3	751.3	751.7	0.4
AC	72,510	100	926	5.1	752.9	752.9	753.2	0.3
AD	73,900	100	876	5.3	755.3	755.3	755.8	0.5
AE	74,620	100	1053	4.4	756.8	756.8	757.4	0.6
AF	75,550	60	569	5.7	759.1	759.1	759.8	0.7
AG	76,260	60	605	5.4	762.7	762.7	763.3	0.6
AH	77,440	100	898	3.6	766.1	766.1	766.8	0.7
AI	78,345	90	570	5.4	770.0	770.0	770.3	0.3
AJ	78,975	119	552	5.6	774.6	774.6	774.7	0.1
AK	80,480	145	1124	2.7	778.7	778.7	778.8	0.1
AL	81,205	165	1169	2.6	781.0	781.0	781.3	0.3
AM	82,380	167	1036	2.8	784.1	784.1	784.4	0.3
AN	83,400	118	415	3.9	785.7	785.7	786.0	0.3
AO	84,425	71	211	7.7	793.2	793.2	793.2	0.0

[1]FEET ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFURD CO.)

FLOODWAY DATA

NORTH BUFFALO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
NORTH BUFFALO CREEK TRIBUTARY A								
A	90	55	418	7.5	757.9	754.6[2]	755.1	0.5
B	455	55	430	7.3	757.9	757.0[2]	757.1	0.1
C	1025	60	546	5.7	762.5	762.5	762.6	0.1
D	1485	122	784	4.0	769.2	769.2	769.2	0.0
E	2675	130	1093	2.7	774.8	774.8	774.8	0.0
F	3645	140	334	5.8	774.5	774.5	774.5	0.0
G	4045	95	537	3.6	775.0	775.0	776.0	1.0
H	4350	80	495	3.9	780.0	780.0	780.0	0.0
I	5240	130	596	3.1	781.2	781.2	781.4	0.2
J	5450	100	758	2.4	784.4	784.4	784.6	0.2
K	6174	23	251	7.4	788.7	788.7	788.7	0.0
L	6946	69	389	4.8	789.8	789.8	790.4	0.6
M	7376	24	219	8.0	794.2	794.2	794.2	0.0
N	7700	60	339	5.2	795.2	795.2	795.9	0.7
O	8430	60	190	7.9	798.9	798.9	799.3	0.4
P	8910	50	239	6.3	804.2	804.2	804.8	0.6
Q	9425	44	277	5.2	807.4	807.4	807.5	0.1
R	9740	49	287	5.0	808.5	808.5	808.6	0.1

[1]FEET ABOVE MOUTH
[2]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECTS FROM NORTH BUFFALO CREEK

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

NORTH BUFFALO CREEK TRIBUTARY A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SOUTH BUFFALO CREEK								
A	48,475	738[2]	6107	1.7	716.8	716.8	717.6	0.8
B	49,175	580[2]	5110	2.0	717.6	717.6	718.3	0.7
C	50,035	625[2]	5742	1.8	719.1	719.1	791.5	0.4
D	51,620	597[2]	5252	2.0	720.1	720.1	720.8	0.7
E	52,350	371[2]	2845	3.3	721.5	721.5	722.0	0.5
F	53,460	424[2]	3046	3.1	723.4	723.4	723.7	0.3
G	54,000	577	4972	1.9	724.8	724.8	725.1	0.3
H	54,770	460	3931	2.3	725.2	725.2	725.7	0.5
I	56,780	651	6310	1.5	726.7	726.7	727.3	0.6
J	58,050	885	5231	1.5	729.7	729.7	730.0	0.3
K	59,000	296	2373	3.3	730.9	730.9	731.1	0.2
L	61,150	407	4001	2.0	732.4	732.4	732.9	0.5
M	62,650	449	4838	1.6	733.3	733.3	733.7	0.4
N	64,370	600	4183	1.7	734.0	734.0	734.3	0.3
O	65,700	500	3923	1.5	734.3	734.3	734.9	0.6
P	66,145	323	1899	3.2	734.4	734.4	735.1	0.7
Q	66,675	500	4084	1.5	735.3	735.3	735.8	0.5
R	67,360	200	1821	3.3	737.3	737.3	737.8	0.5
S	68,880	165	1329	4.5	738.3	738.3	738.9	0.6
T	69,670	239	2579	2.3	742.0	742.0	742.4	0.4
U	72,030	455	3813	1.6	742.9	742.9	743.3	0.4
V	74,480	400	3240	1.7	745.4	745.4	745.8	0.4
W	75,470	650	4712	1.2	745.8	745.8	746.4	0.6
X	76,680	370	2407	2.3	746.4	746.4	747.2	0.8
Y	77,530	220	1715	3.2	750.3	750.3	750.5	0.2
Z	78,100	200	1499	3.1	751.3	751.3	751.9	0.6

[1]FEET ABOVE MOUTH
[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

SOUTH BUFFALO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SOUTH BUFFALO CREEK								
AA	78,690	200	1329	3.5	752.6	752.6	753.5	0.9
AB	81,410	200	1313	3.6	759.7	759.7	759.9	0.2
AC	82,610	200	1062	4.4	763.4	763.4	763.5	0.1
AD	84,320	200	1518	2.9	766.8	766.8	767.2	0.4
AE	86,360	158	1498	2.9	777.8	777.8	778.2	0.4
AF	87,660	150	1428	3.0	779.6	779.6	780.5	0.9
AG	88,630	124	1287	3.3	780.3	780.3	781.0	0.7
AH	89,740	185	1381	3.1	783.3	783.3	783.6	0.3
AI	90,220	200	1513	2.8	783.9	783.9	784.2	0.3
AJ	91,430	180	1520	2.8	785.1	785.1	785.5	0.4
AK	92,550	150	1055	4.1	788.0	788.0	788.0	0.0
AL	94,770	82	523	7.5	794.4	794.4	794.8	0.4
AM	95,220	150	1398	2.8	796.4	796.4	796.6	0.2
AN	96,170	220	1848	2.1	797.4	797.4	797.9	0.5
AO	96,510	200	1433	2.7	797.5	797.5	798.0	0.5
AP	97,265	200	1739	2.2	800.8	800.8	801.1	0.3
AQ	97,590	125	925	4.2	801.0	801.0	801.3	0.3
AR	99,720	180	857	2.6	805.7	805.7	806.0	0.3
AS	100,400	130	759	2.9	807.1	807.1	807.6	0.5
AT	101,020	130	544	4.0	809.3	809.3	810.1	0.8
AU	101,790	120	585	3.8	814.0	814.0	814.3	0.3
AV	103,720	80	401	5.5	824.9	824.9	825.1	0.2
AW	104,640	120	2050	0.9	842.4	842.4	842.4	0.0
AX	105,240	120	1440	1.3	842.4	842.4	842.4	0.0
AY	105,620	120	1080	1.7	844.0	844.0	844.4	0.4
AZ	105,920	100	865	2.1	844.1	844.1	844.6	0.5

[1]FEET ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

SOUTH BUFFALO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SOUTH BUFFALO CREEK								
BA	106,230	120	989	1.9	844.2	844.2	844.9	0.7
BB	106,620	76	568	3.3	844.5	844.5	845.3	0.8
BC	107,550	120	423	3.8	847.1	847.1	847.6	0.5
BD	180,560	80	355	4.5	854.7	854.7	855.0	0.3
BE	108,980	80	284	3.2	857.1	857.1	857.7	0.6
BF	109,820	80	241	3.7	864.0	864.0	864.4	0.4
BG	110,230	80	299	3.0	867.3	867.3	867.6	0.3
BH	110,480	80	230	3.9	869.3	869.3	869.5	0.2
SOUTH BUFFALO CREEK TRIBUTARY B								
A	800	65	225	4.7	814.1	813.5	814.1	0.6
B	1000	75	326	3.2	816.4	816.4	816.6	0.2
C	1345	70	563	1.9	825.3	825.3	826.0	0.7
D	1910	50	307	3.2	825.6	825.6	826.3	0.7
E	2550	75	552	0.6	833.4	833.4	834.0	0.6
F	3745	100	390	2.3	835.9	835.9	836.6	0.7
G	4475	60	207	3.6	841.1	841.1	841.1	0.0
H	5425	90	294	2.6	846.9	846.9	847.2	0.3
I	6075	90	176	3.2	852.3	852.3	852.4	0.1
J	6665	60	200	2.8	857.6	857.6	857.9	0.3
K	7530	75	209	2.8	868.2	868.2	868.9	0.7
L	8625	50	124	4.0	878.4	878.4	879.0	0.6

[1]FEET ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

SOUTH BUFFALO CREEK—SOUTH BUFFALO CREEK TRIBUTARY B

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SOUTH BUFFALO CREEK TRIBUTARY A								
A	740	150	778	2.9	807.0	807.0	807.7	0.7
B	1400	150	767	2.9	810.5	810.5	811.5	1.0
C	1800	150	660	2.6	813.0	813.0	814.0	1.0
D	2200	175	999	1.7	814.1	814.1	815.1	1.0
E	2360	150	731	2.3	814.4	814.4	815.4	1.0
F	2620	40	177	9.2	815.4	815.4	815.9	0.5
G	3100	120	1048	1.6	824.2	824.2	824.9	0.7
H	3720	155	1285	1.3	824.4	824.4	825.3	0.9
I	4100	160	903	1.8	824.5	824.5	825.5	1.0
J	4570	120	467	3.5	825.5	825.5	826.4	0.9
K	5170	55	440	3.2	833.4	833.4	833.4	0.0
L	5750	60	334	4.0	834.1	834.1	834.5	0.4
M	6090	100	869	1.7	837.7	837.7	838.2	0.5
N	6500	160	1098	1.4	837.9	837.9	838.5	0.6
O	6920	160	781	1.9	838.2	838.2	839.1	0.9
P	7580	140	435	3.4	840.8	840.8	841.7	0.9
Q	8130	100	387	3.1	845.3	845.3	846.1	0.8
R	8590	80	270	2.8	847.5	847.5	848.4	0.9
S	9375	50	703	1.5	865.4	865.4	865.5	0.1
T	9900	50	452	2.1	865.4	865.4	865.7	0.3
U	10,350	50	326	2.9	865.6	865.6	866.0	0.4
V	10,840	45	191	4.9	866.9	866.9	867.1	0.2
W	11,250	50	151	5.0	873.5	873.5	874.1	0.6
X	11,830	50	151	5.0	880.6	880.6	880.8	0.2
Y	12,310	50	123	5.0	889.3	889.3	889.3	0.0

[1]FEET ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

SOUTH BUFFALO CREEK TRIBUTARY A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
EAST FORK DEEP RIVER								
A	35126	150	826	5.1	821.9	821.9	822.7	0.8
MUDDY CREEK								
A	300	60	454	6.6	712.3	706.8[2]	707.4	0.6
B	1210	50	440	6.8	712.3	710.3[2]	710.4	0.1
C	1613	100	731	4.1	713.4	713.4	713.5	0.1
D	3050	86	558	5.4	717.2	717.2	717.5	0.3
E	4300	100	894	3.4	720.1	720.1	720.4	0.3
F	5440	100	520	4.8	725.5	725.5	725.5	0.0
G	6260	100	455	5.5	727.5	727.5	727.5	0.0
H	7230	100	414	6.1	729.6	729.6	729.6	0.0
I	8360	100	441	5.7	733.0	733.0	733.0	0.0
J	9300	100	720	3.5	736.0	736.0	736.8	0.8
K	9825	62	505	5.0	737.0	737.0	737.8	0.8
L	10,500	100	630	4.0	738.8	738.8	739.4	0.6
M	11,520	100	489	4.7	741.7	741.7	742.2	0.5
N	12,525	74	457	5.1	747.5	747.5	748.4	0.9
O	13,000	70	445	4.9	748.1	748.1	748.9	0.8

[1]FEET ABOVE MOUTH
[2]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM NORTH BUFFALO CREEK

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

EAST FORK DEEP RIVER—MUDDY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
TWIN LAKES TRIBUTARY								
A	400	280	1124	2.2	750.8	747.9[2]	748.6	0.7
B	1160	85	349	7.1	752.5	752.5	752.6	0.1
C	1710	110	688	3.6	755.6	755.6	755.9	0.3
D	3120	100	567	4.2	761.6	761.6	761.7	0.1
E	3985	100	453	5.2	764.5	764.5	764.9	0.4
F	4145	80	605	3.9	766.4	766.4	766.9	0.5
G	4895	60	349	6.8	769.2	769.2	770.0	0.8
H	5530	90	793	2.9	773.5	773.5	774.2	0.7
I	5715	100	698	3.3	773.6	773.6	774.4	0.8
HORSEPEN CREEK								
A	39,260	140	893	2.6	801.1	801.1	802.0	0.9
B	41,850	115	570	3.6	811.6	811.6	812.6	1.0
C	44,180	85	505	2.8	821.9	821.9	822.9	1.0
RICHLAND CREEK								
A	14,600	175[3]	946	2.2	754.9	754.9	755.9	1.0
B	18,260	100	423	3.7	769.0	769.0	769.7	0.7

[1]FEET ABOVE MOUTH
[2]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM SOUTH BUFFALO CREEK
[3]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

TWIN LAKES TRIBUTARY—HORSEPEN CREEK—RICHLAND CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
RYAN CREEK								
A	670	145	735	4.4	734.0	730.6[2]	731.4	0.8
B	2000	85	642	5.0	736.0	736.0	736.5	0.5
C	3120	55	414	7.1	737.4	737.4	737.8	0.4
D	3900	55	389	7.5	739.1	739.1	739.3	0.2
E	4660	65	494	5.9	741.6	741.6	741.8	0.2
F	6720	200	1269	2.3	745.4	745.4	746.2	0.8
G	9100	100	559	3.8	751.8	751.8	752.7	0.9
H	10,640	110	528	3.7	757.3	757.3	758.0	0.7
I	11,125	90	637	3.0	762.4	762.4	763.0	0.6
J	11,700	110	673	2.9	766.0	766.0	766.9	0.9
K	13,055	100	515	3.2	768.2	768.2	769.0	0.8
L	14,100	70	298	4.0	771.8	771.8	772.4	0.6
M	15,130	80	422	2.6	778.1	778.1	778.6	0.5

[1]FEET ABOVE MOUTH
ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM SOUTH BUFFALO CREEK

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

RYAN CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
MILE RUN CREEK								
A	1140	260	1583	1.5	729.2	727.4[2]	728.1	0.7
B	2360	175	688	3.5	729.2	729.0[2]	729.8	0.8
C	3305	100	482	4.9	732.2	732.2	732.5	0.3
D	3750	120	720	3.0	734.7	734.7	735.1	0.4
E	4780	82	342	5.6	737.9	737.9	738.0	0.1
F	5335	106	486	3.8	740.2	740.2	740.7	0.5
G	5940	80	575	3.1	747.8	747.8	748.3	0.5
H	6500	80	391	4.6	748.8	748.8	749.2	0.4
I	6940	120	983	1.8	755.2	755.2	755.6	0.4
J	7340	120	799	2.2	755.3	755.3	755.7	0.4
K	7720	70	267	6.5	755.4	755.4	756.0	0.6
L	7850	45	159	10.9	757.9	757.9	757.9	0.0
M	8010	80	533	3.1	763.3	763.3	763.7	0.4

[1]FEET ABOVE MOUTH
ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM SOUTH BUFFALO CREEK

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

MILE RUN CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
BULL RUN CREEK								
A	20,800	60	649	4.3	769.6	769.6	770.4	0.8
B	23,080	110	889	3.2	776.5	776.5	777.3	0.8
C	25,000	80	513	4.5	782.9	782.9	783.7	0.8
D	27,520	118	542	4.2	795.8	795.8	796.8	1.0
BULL RUN CREEK TRIBUTARY								
A	160	50	311	4.3	778.0	777.2[2]	778.2	1.0

[1]FEET ABOVE MOUTH
[2]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECTS FROM BULL RUN CREEK

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOODWAY DATA

BULL RUN CREEK—BULL RUN CREEK TRIBUTARY

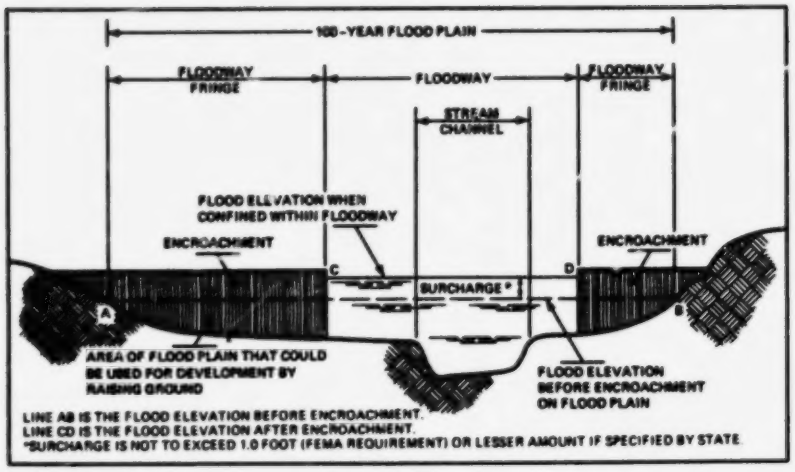
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 4 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

In 1966, the COE published a study of the flooding conditions along North and South Buffalo Creeks (Reference 6). The COE also performed floodway analyses for North Buffalo, South Buffalo, Mile Run, and Muddy Creeks and provided the City of Greensboro with floodway boundary maps (Reference 14) in 1971. Also, in 1978, the COE prepared the Flood Insurance Rate Map for the City of Greensboro (Reference 1) for the Federal Insurance Administration. This Flood Insurance Study supersedes these previously published reports.

This study was coordinated with the Flood Insurance Study for Guilford County, North Carolina (Reference 15).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, NE., Suite 736, Atlanta, Georgia 30309.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Rate Map, City of Greensboro, Guilford County, North Carolina, December 1978.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population and Housing, North Carolina, Washington, D.C., February 1982.

3. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Guilford County, North Carolina, 1977.

4. U.S. Geological Survey, Water Resources Data for North Carolina, 1980.

5. ————, Water Resources Data for North Carolina, 1978.

6. U.S. Army Corps of Engineers, Wilmington District, North Buffalo Creek and South Buffalo Creek, Greensboro, North Carolina, Flood Plain Information Report, 1966.

7. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Code of Federal Regulations, Title 24, Chapter 10, Parts 1910.3A and 3B, Federal Register, Vol. 41, No. 207, revised 1976.

8. Nathan O. Thomas, P.E., Hydrologic Study of Reidsville, North Carolina, November 1976.

9. U.S. Geological Survey, Effect of Urban Development on Floods in the Piedmont Province of North Carolina, Arthur L. Putnam, 1972.

10. KUCERA & Associates, Inc., City of Greensboro, N.C., Topographic Sheets, Scale 1:4800, Contour Interval 2 Feet: 1982.

11. Aero Service Corporation, City of Greensboro, N.C., Topographic Sheets, Scale 1:4800, Contour Interval 2 Feet: 1955 and 1957.

12. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Generalized Computer Program, Davis, California, April 1984.

13. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 Feet: Climax, North Carolina, 1970, photorevised 1982; Pleasant Garden, North Carolina, 1970, photorevised 1982; High Point East, North Carolina, 1950, photorevised 1968; Browns Summit 1951, photorevised 1968; Lake Brandt, North Carolina, 1951, photorevised 1968; Summerfield, North Carolina, 1951, photorevised 1968; Greensboro, North Carolina, 1951, photorevised 1968; McLeansville, North Carolina, 1951, photorevised 1968; Guilford, North Carolina, 1951, photorevised 1968.

14. U.S. Army Corps of Engineers, Wilmington District, Greensboro Flood Zone Maps, dated August 1971.

15. Federal Emergency Management Agency, Flood Insurance Rate Map, Guilford County, Unincorporated Areas, North Carolina, June 1980, revision in progress.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0002	773.62	nail and cap in power pole 51A, approximately 50 feet south of bank of Richland Creek on Lawndale Drive
2	0006	798.85	chiseled square in left corner of downstream side of bridge at Ballinger Road over Horsepen Creek
3	0006	809.60	nail and cap in left corner of downstream side of bridge at Stage Coach Trail over Horsepen Creek
4	0008	777.93	nail and cap in left downstream side of bridge at Fleming Road over Horsepen Creek
5	0008	763.31	chiseled square on left downstream side of headwall of northbound exit from Wendover Avenue to Benjamin Parkway culvert for North Buffalo Creek Tributary A
6	0008	778.64	chiseled square on left downstream side of headwall of Pembroke Road culvert for North Buffalo Creek Tributary A
7	0008	781.62	chiseled square on left downstream side of headwall of Cornwallis Road culvert for North Buffalo Creek Tributary A
8	0008	787.34	chiseled square on left downstream side of headwall of Benjamin Parkway culvert for North Buffalo Creek Tributary A
9	0008	791.49	brass disk COG no. 21, 0.2 mile south of Gracewood Drive, 9.0 feet west of southbound lane of Benjamin Parkway, 23 feet south of Duke power pole no. E24, east of North Buffalo Creek Tributary A
10	0009	726.77	chiseled square on right downstream abutment of Summit Street bridge over North Buffalo Creek

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
11	0009	733.559	brass disk COG no. 129 in southwest wingwall of Yanceyville Street bridge over North Buffalo Creek
12	0009	740.03	brass disk COG no. 131 in southeast wingwall of North Elm Street bridge over North Buffalo Creek
13	0011	822.01	chiseled square on left downstream headwall on Albert Pick Road over the East Fork Deep River
14	0012	801.30	chiseled square in left downstream headwall of Norfolk Road culvert for South Buffalo Creek
15	0012	830.95	chiseled square in left downstream headwall of Wendover Avenue culvert for South Buffalo Creek
16	0012	844.71	top of fire hydrant at intersection of Big Tree Way and Shelby Drive, on north side of South Buffalo Creek
17	0012	825.17	chiseled cross in left downstream headwall of Wendover Avenue culvert located at intersection of Carnegie Place and Wendover Avenue along South Buffalo Tributary B
18	0012	817.69	chiseled cross in left downstream headwall of Wendover Avenue culvert for South Buffalo Tributary A
19	0012	845.48	chiseled cross in left downstream headwall of West Market Street culvert for South Buffalo Tributary A
20	0013	747.121	brass disk COG no. 134 in northwest headwall of Hill Street culvert for North Buffalo Creek
21	0013	755.423	brass disk COG no. 138 in north side of Aycock Street bridge over North Buffalo Creek

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
22	0013	760.722	brass disk COG no. 139 in northwest wingwall of Elam Avenue bridge over North Buffalo Creek
23	0013	783.318	brass disk COG no. 141 in southwest wingwall of West Market Street bridge over North Buffalo Creek
24	0016	798.55	painted cross on top of hand rail on north end of concrete dam on Bull Run Creek
25	0017	781.684	brass disk COG no. 158 in center of upstream headwall of Merritt Drive culvert for South Buffalo Creek
26	0017	791.239	brass disk COG no. 159 in southwest corner of Patterson Street culvert for South Buffalo Creek
27	0018	741.12	top bolt on fire hydrant on south side of Creek Ridge Road across Ryan Creek
28	0018	741.14	chiseled square in left downstream headwall of Randleman Road culvert for Ryan Creek
29	0018	749.59	top bolt on fire hydrant at intersection of Lionne Drive and end of Cheltenham Boulevard on north side of Twin Lakes Tributary
30	0018	781.49	painted square on left downstream side of dam on concrete end wall along Twin Lakes Tributary
31	0018	741.991	brass disk COG no. 152 in northwest wingwall of Randleman Road bridge over South Buffalo Creek
32	0016	758.68	chiseled square in left downstream wingwall of Meadowview Road culvert (downstream crossing) over South Buffalo Creek

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
33	0016	765.14	chiseled square in left downstream wingwall of West Meadowview Road culvert (upstream crossing) over South Buffalo Creek
34	0018	773.94	chiseled square in left downstream wingwall of Maplewood Lane bridge over South Buffalo Creek
35	0019	734.70	chiseled square in left downstream wingwall of Willow Road bridge over South Buffalo Creek
36	0019	729.609	brass disk COG no. 148 in northwest wingwall of Patton Avenue bridge over South Buffalo Creek
37	0019	739.15	chiseled square in left downstream wingwall of Elm-Eugene Street bridge over South Buffalo Creek
38	0019	726.323	brass disk COG no. 147 in southwest corner of Asheboro Street bridge over South Buffalo Creek
39	0019	741.94	chiseled cross in left downstream headwall of Elm-Eugene Street culvert for Mile Run Creek
40	0022	761.57	chiseled square in left downstream headwall of Vandalia Road culvert for Ryan Creek
41	0022	772.11	top last bolt on wheelguard on left downstream side of Rehobeth Church Road bridge over Ryan Creek
42	0022	779.54	top of eye hook on left downstream pipe of Glendale Drive culvert for Ryan Creek

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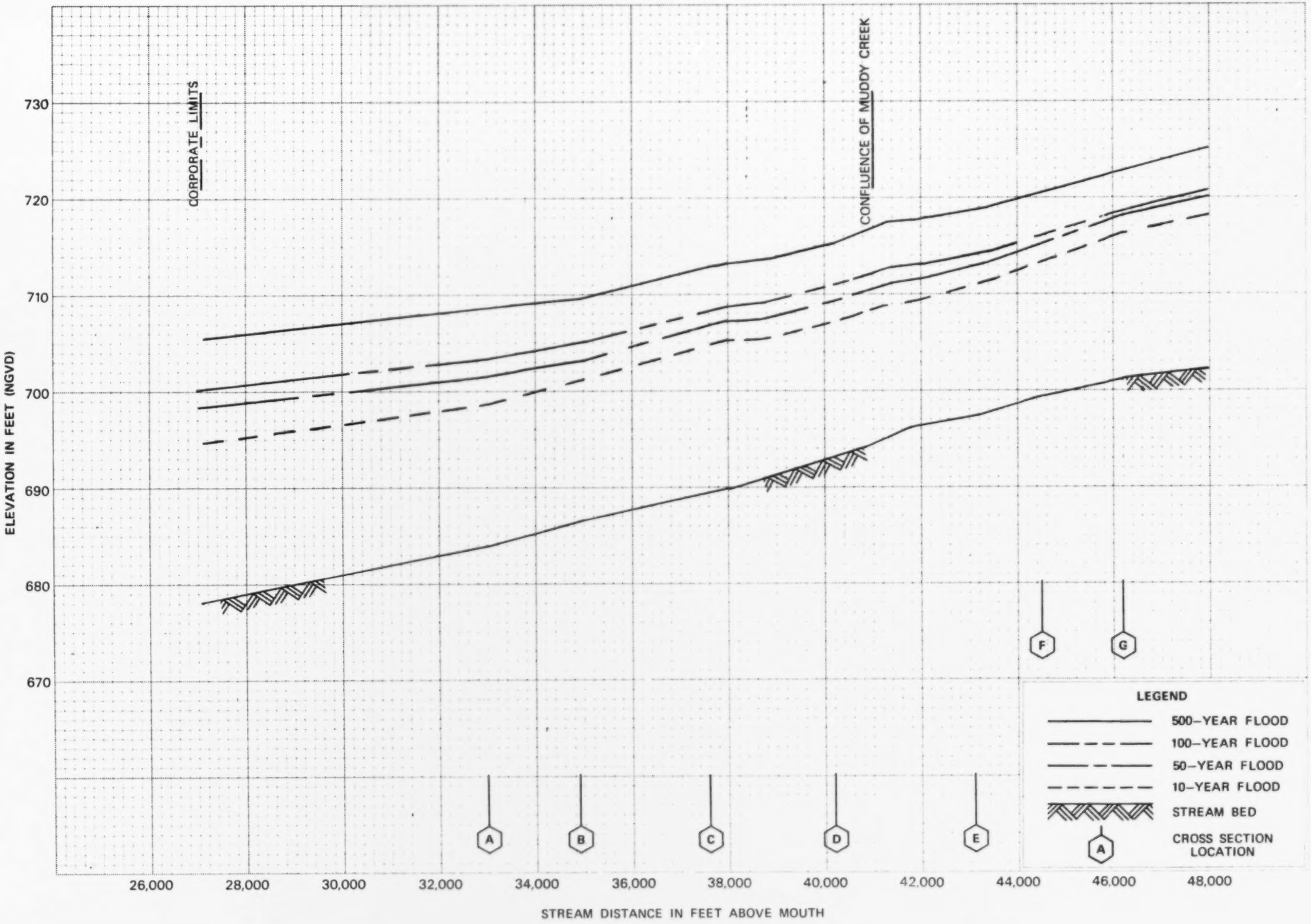


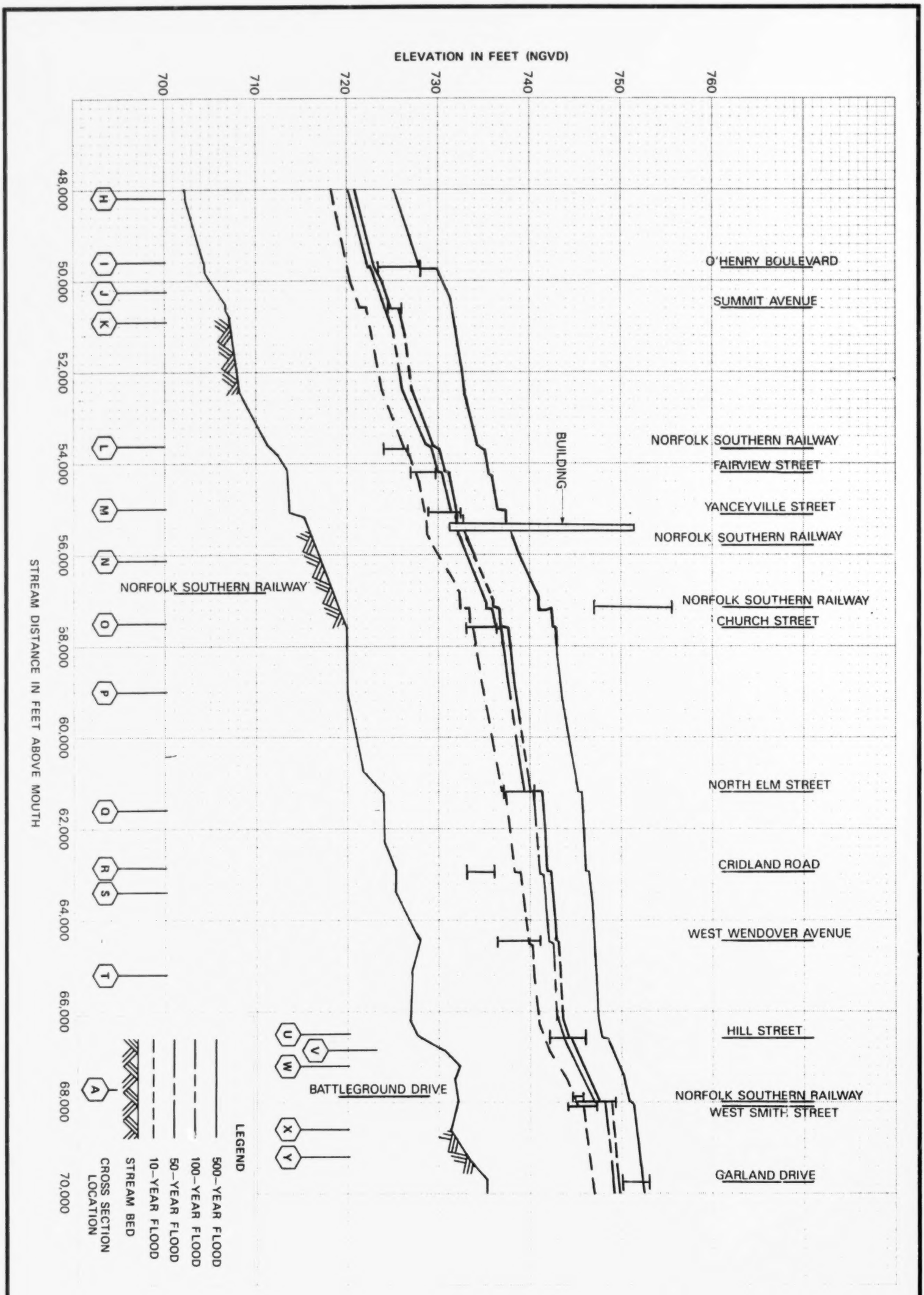
FLOOD PROFILES

NORTH BUFFALO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

01P



02P

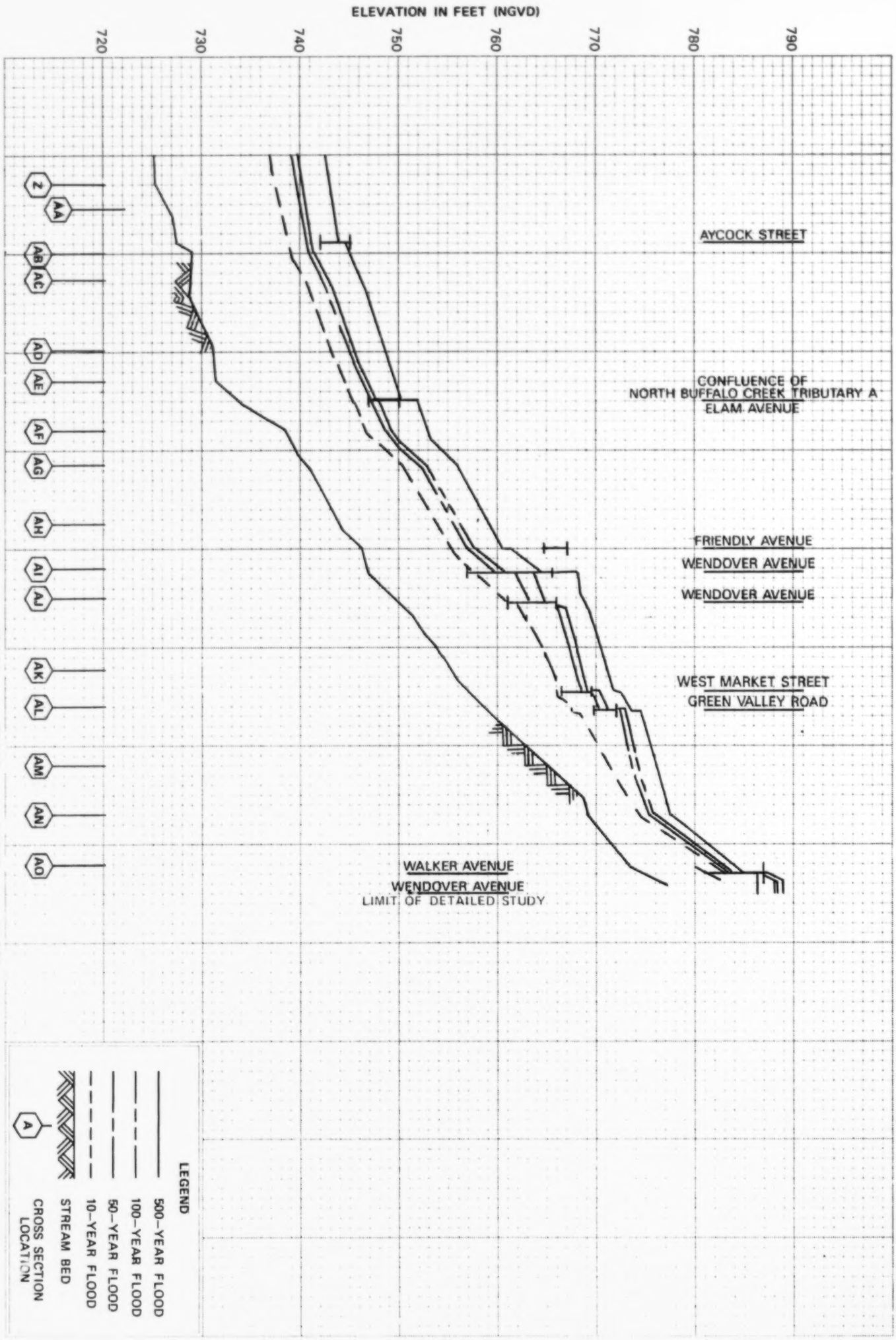
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

FLOOD PROFILES

NORTH BUFFALO CREEK



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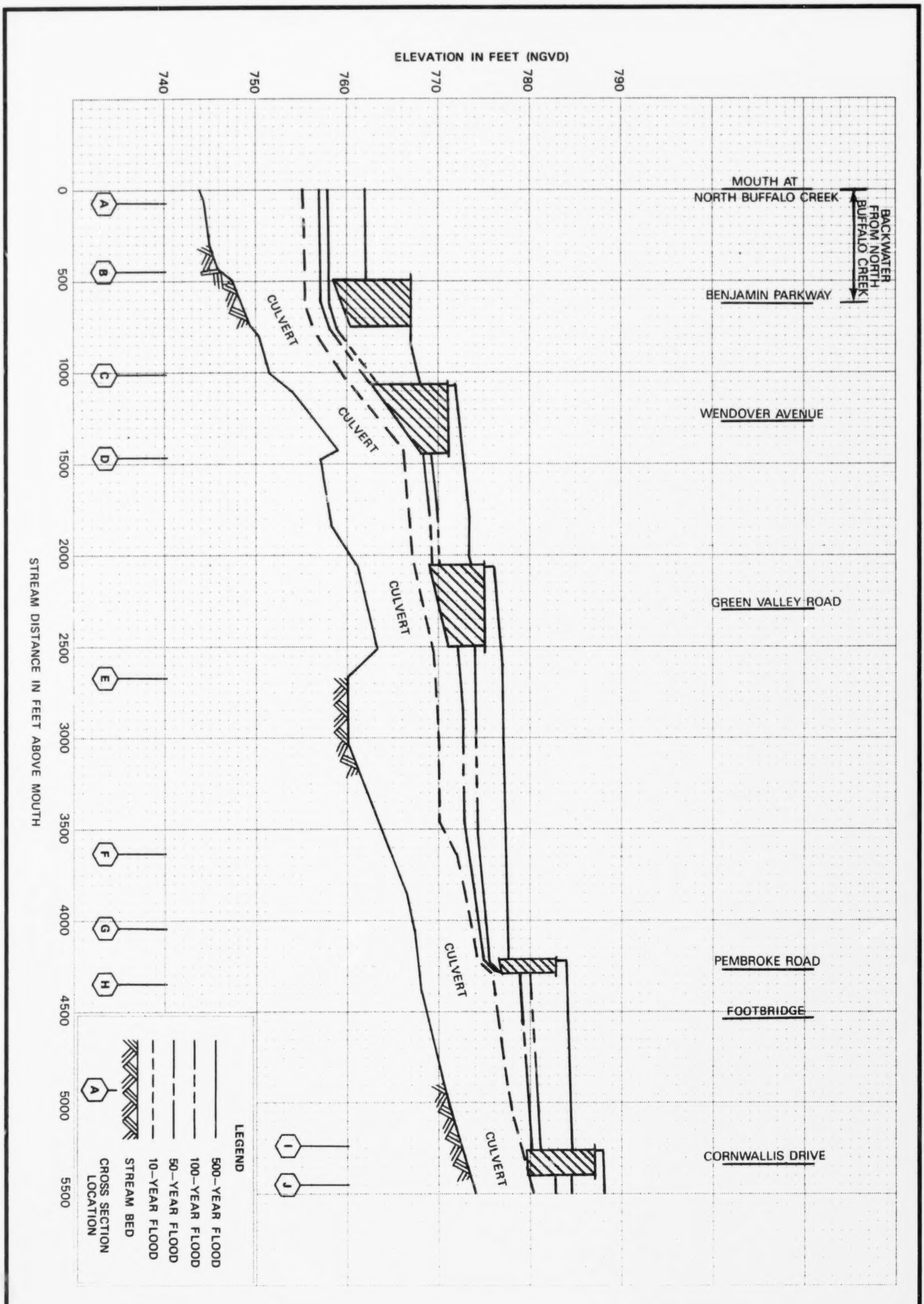
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOOD PROFILES

NORTH BUFFALO CREEK



04P

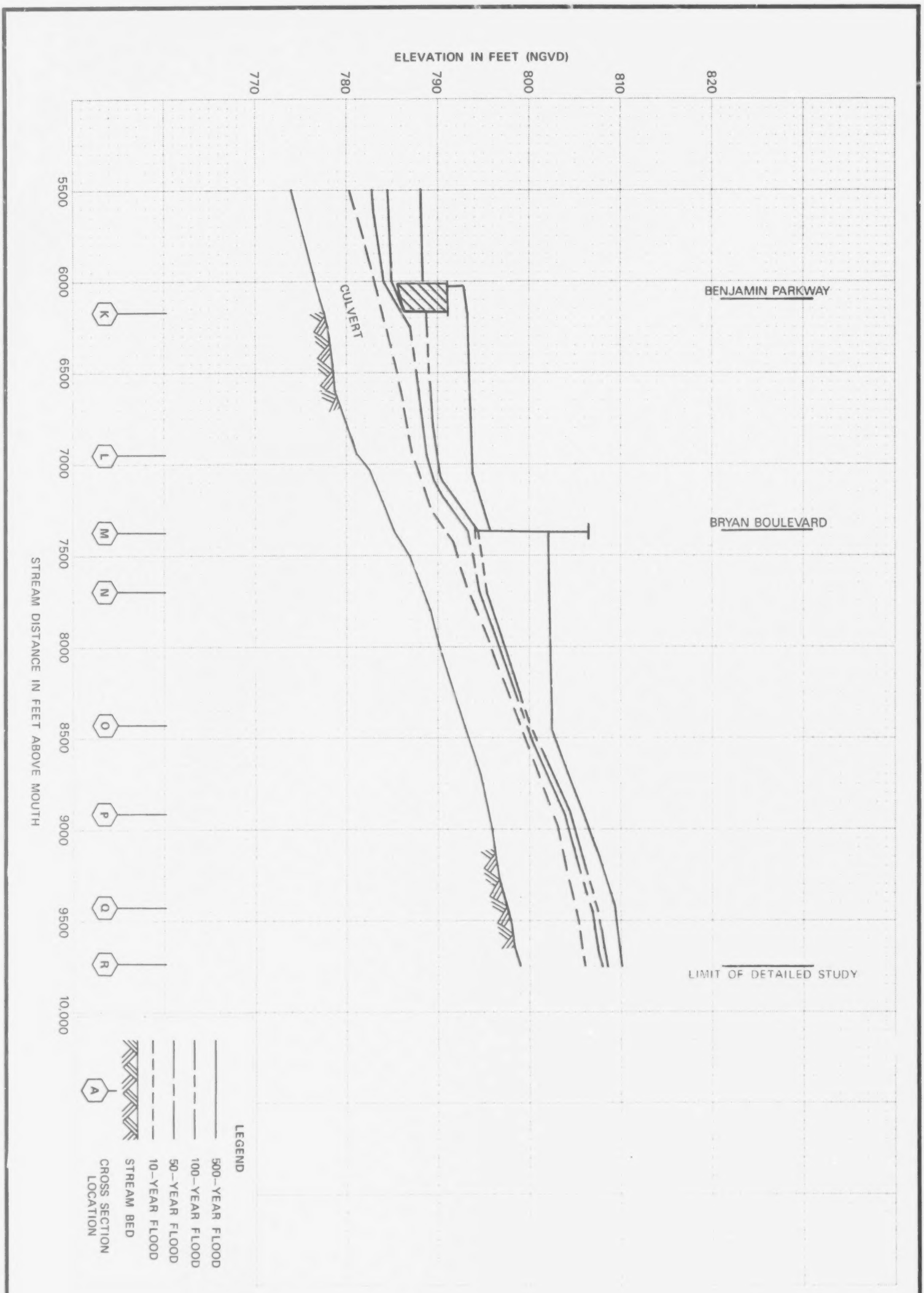
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

FLOOD PROFILES

NORTH BUFFALO CREEK TRIBUTARY A



05P

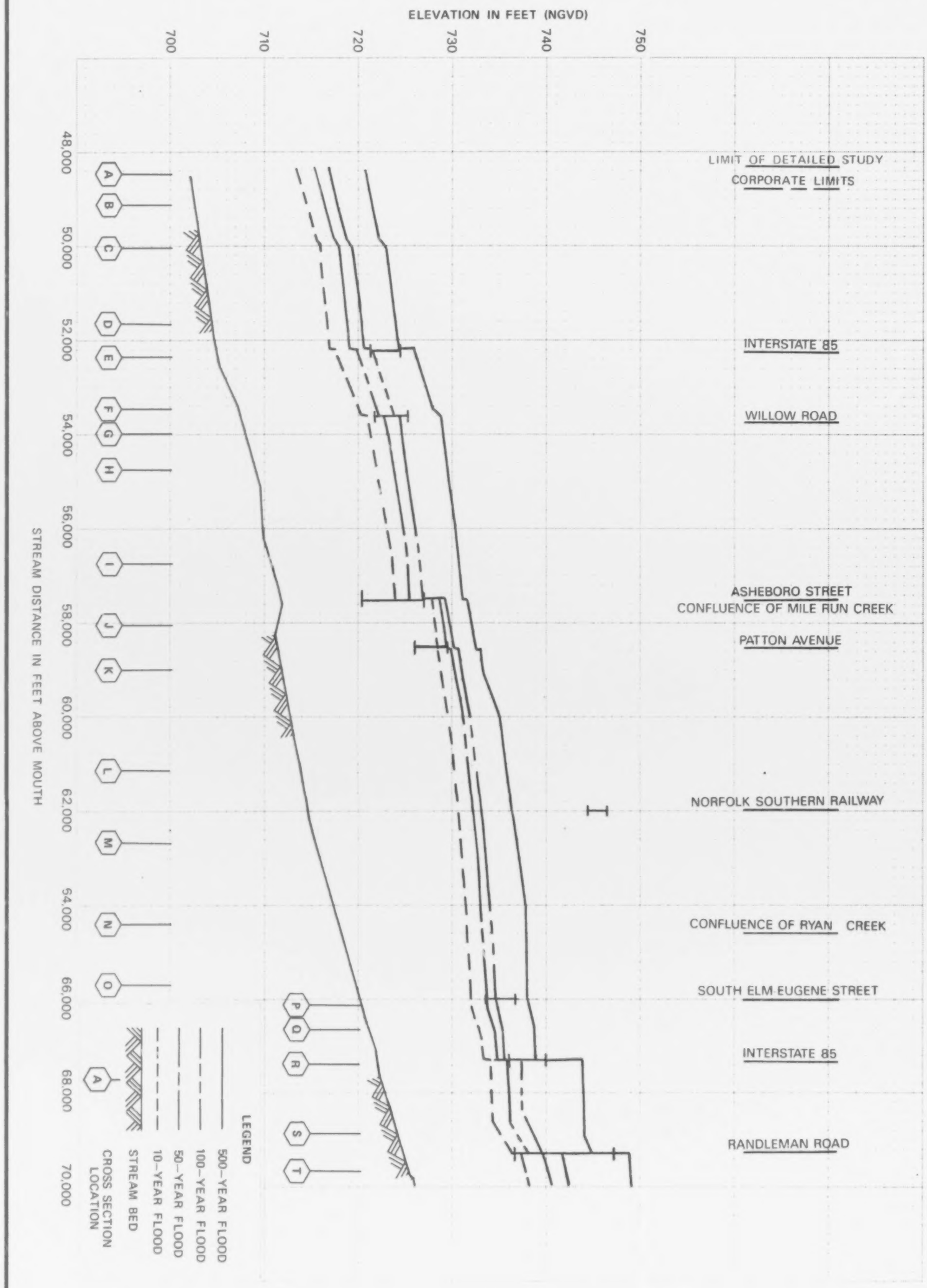
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

FLOOD PROFILES

NORTH BUFFALO CREEK TRIBUTARY A



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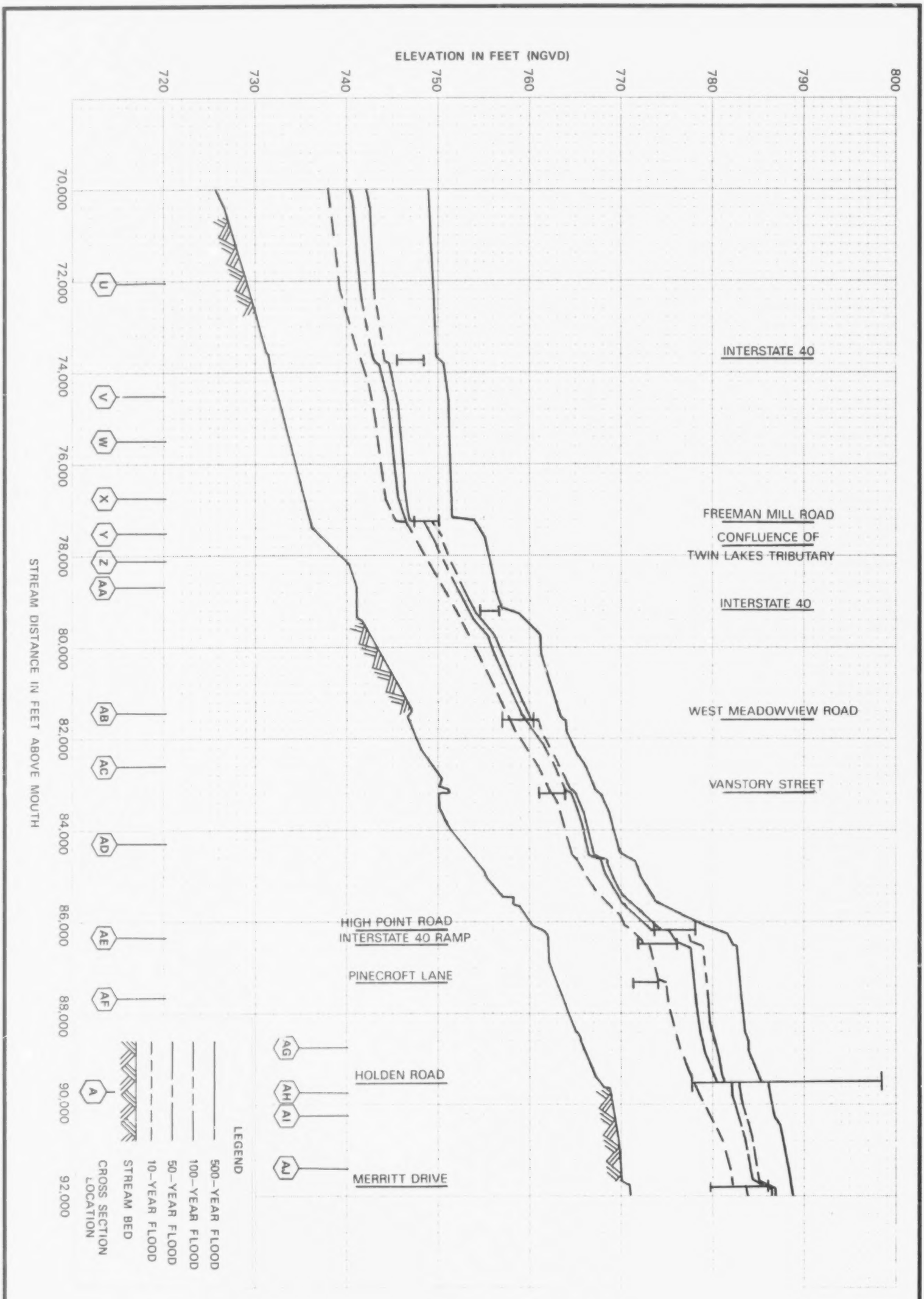
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

FLOOD PROFILES

SOUTH BUFFALO CREEK



07P

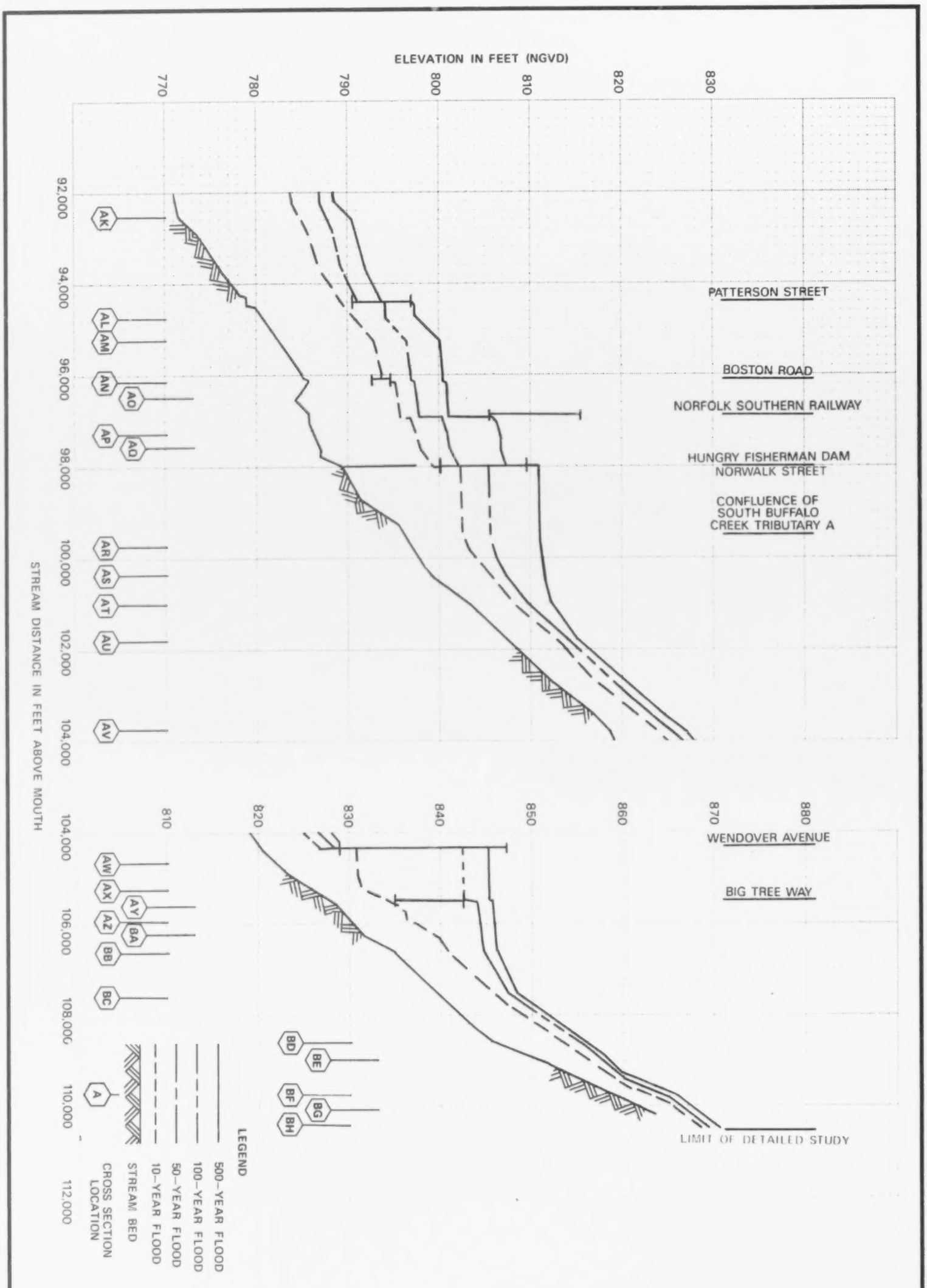
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOOD PROFILES

SOUTH BUFFALO CREEK

37



08P	FEDERAL EMERGENCY MANAGEMENT AGENCY **CITY OF GREENSBORO, NC** (GUILFORD CO.)	**FLOOD PROFILES** **SOUTH BUFFALO CREEK**

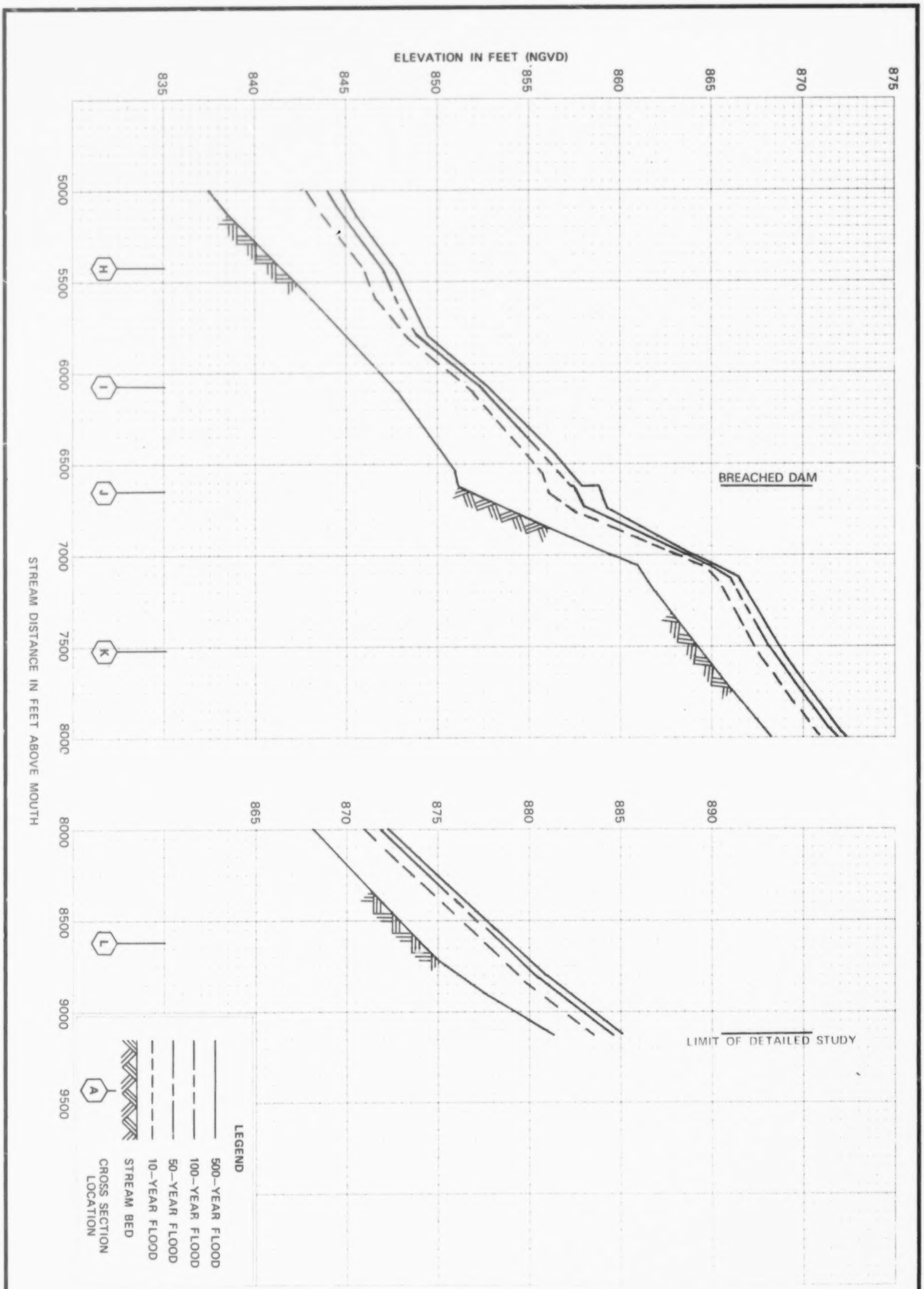
FLOOD PROFILES

SOUTH BUFFALO CREEK TRIBUTARY B

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

09P



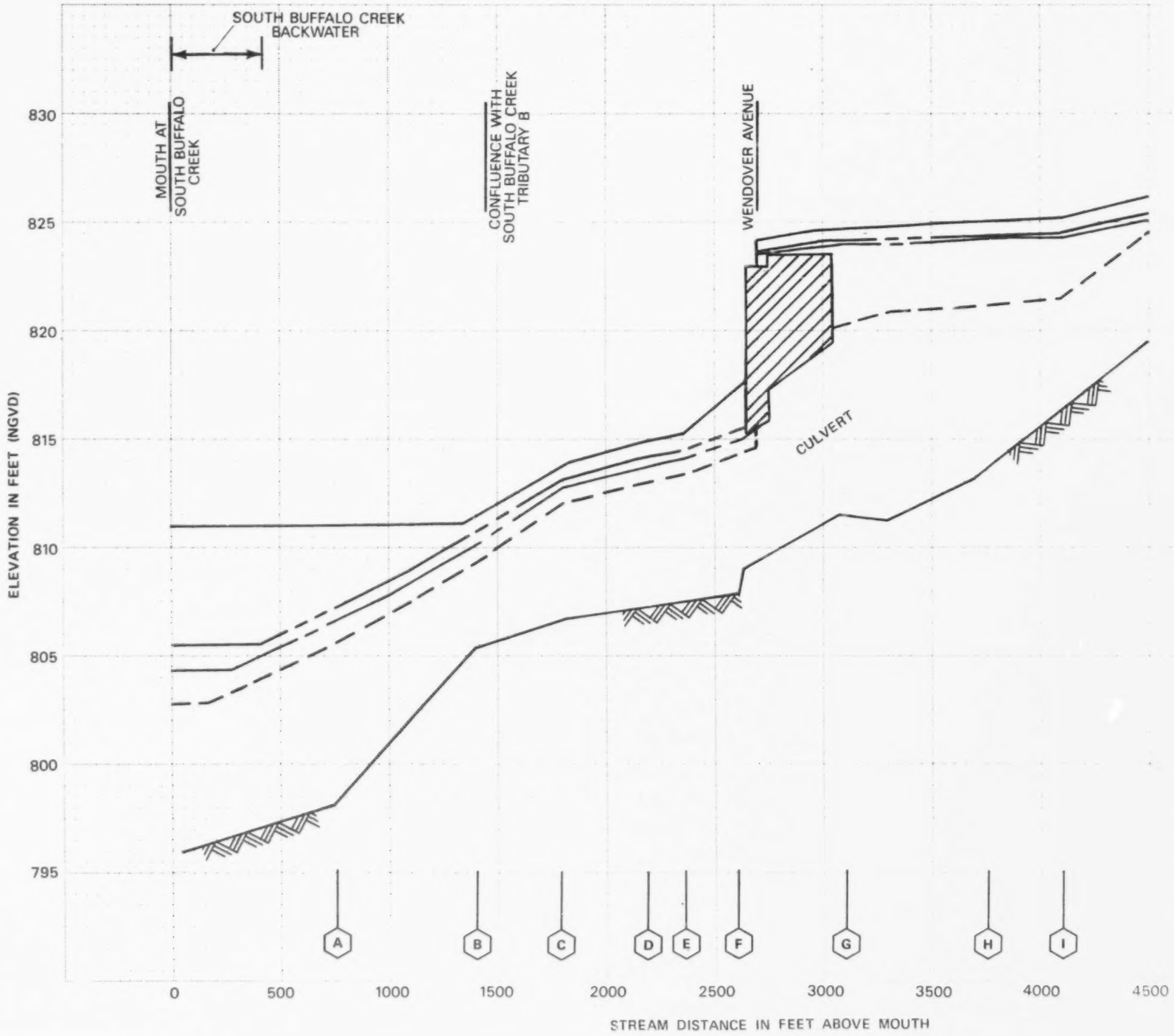
10P

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOOD PROFILES

SOUTH BUFFALO CREEK TRIBUTARY B



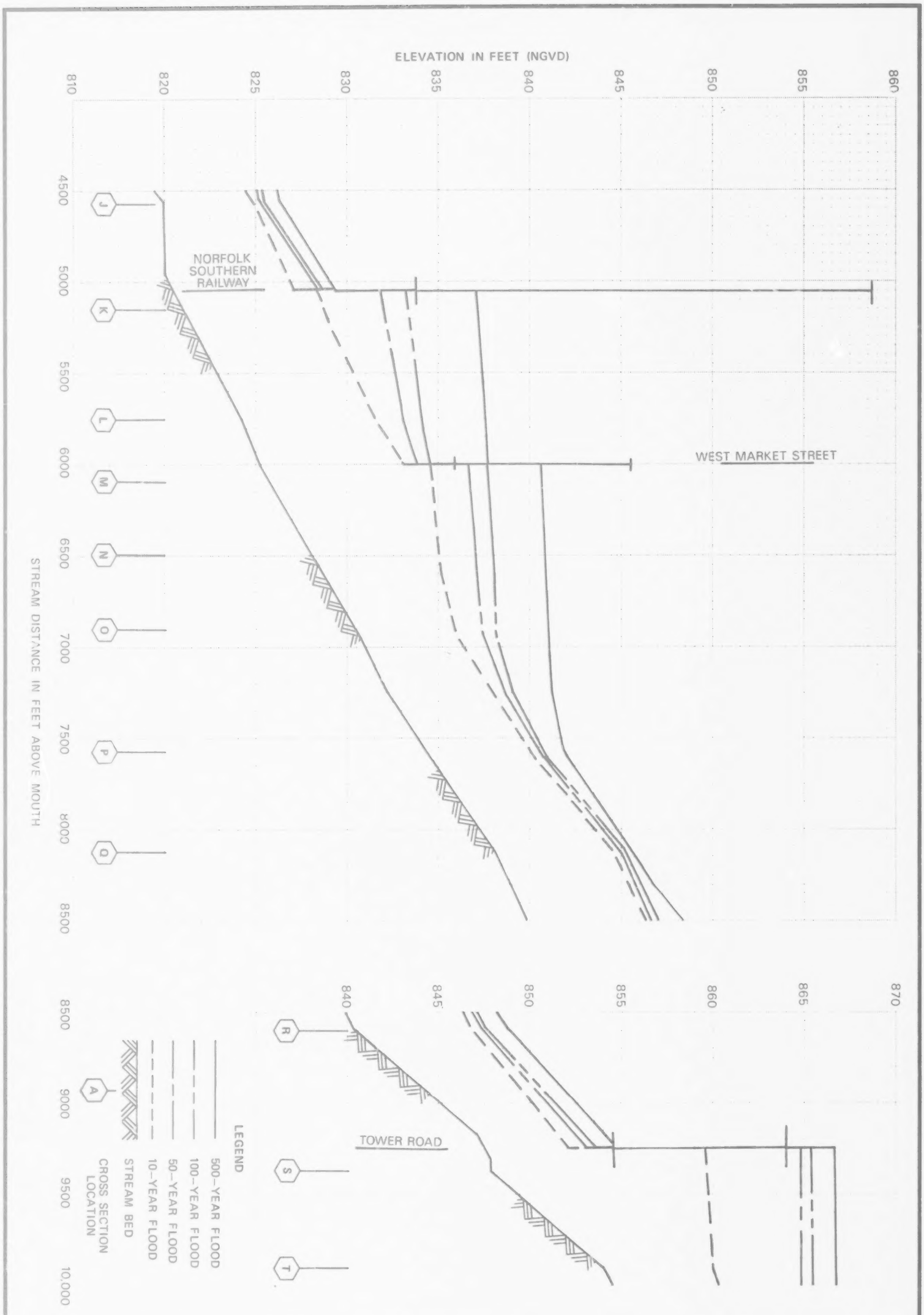
FLOOD PROFILES

SOUTH BUFFALO CREEK TRIBUTARY A

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

11P



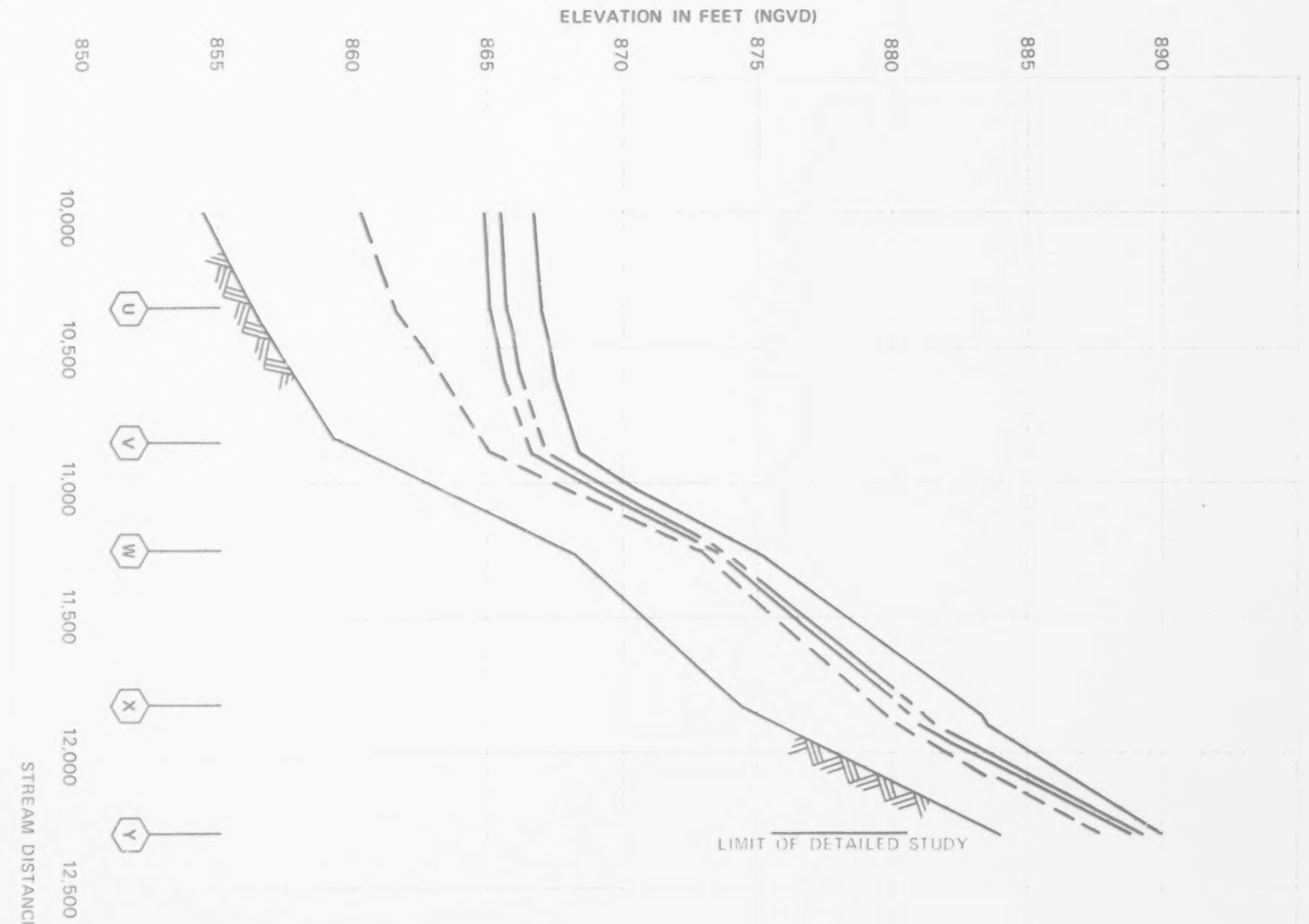
12P

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOOD PROFILES

SOUTH BUFFALO CREEK TRIBUTARY A



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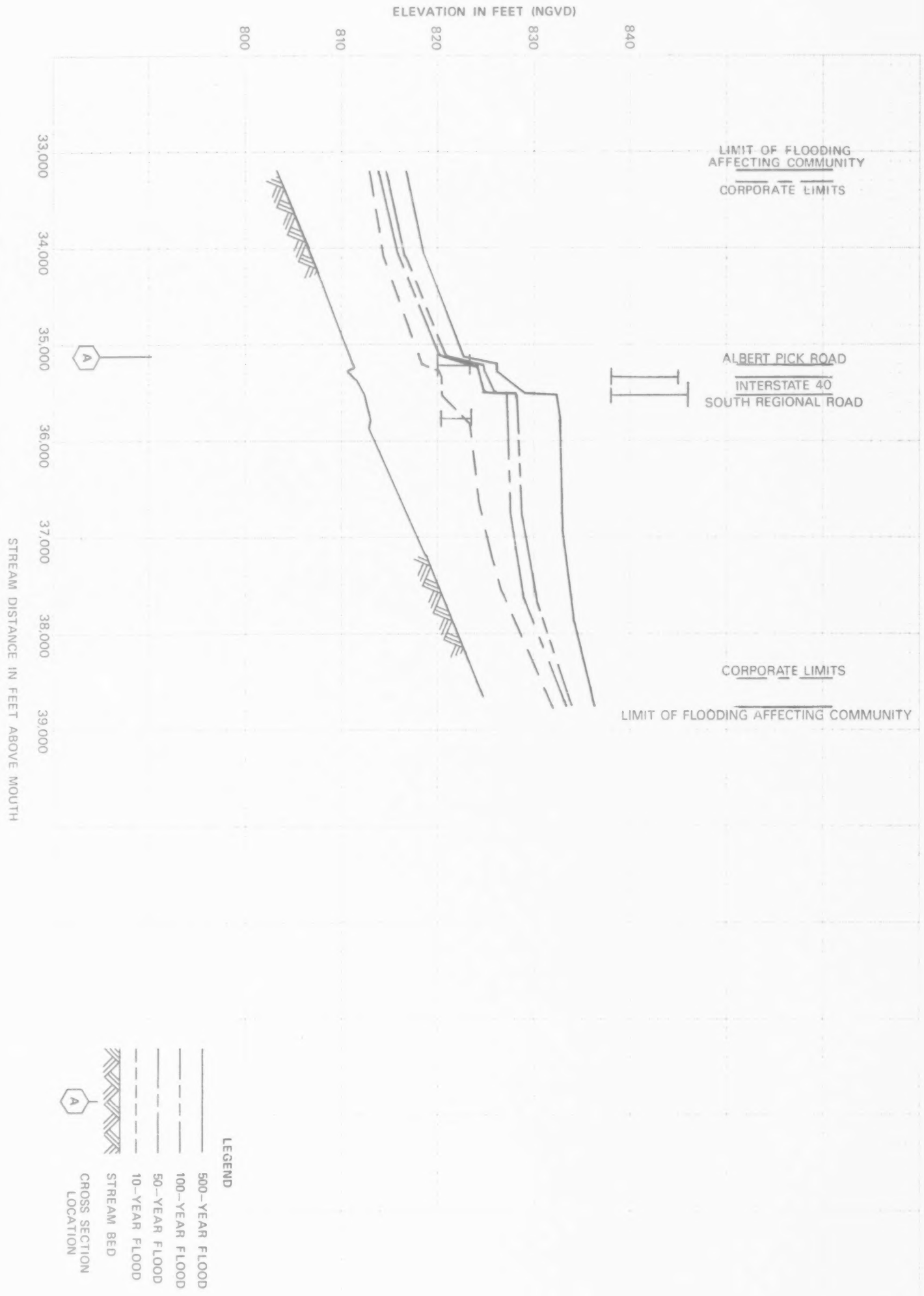
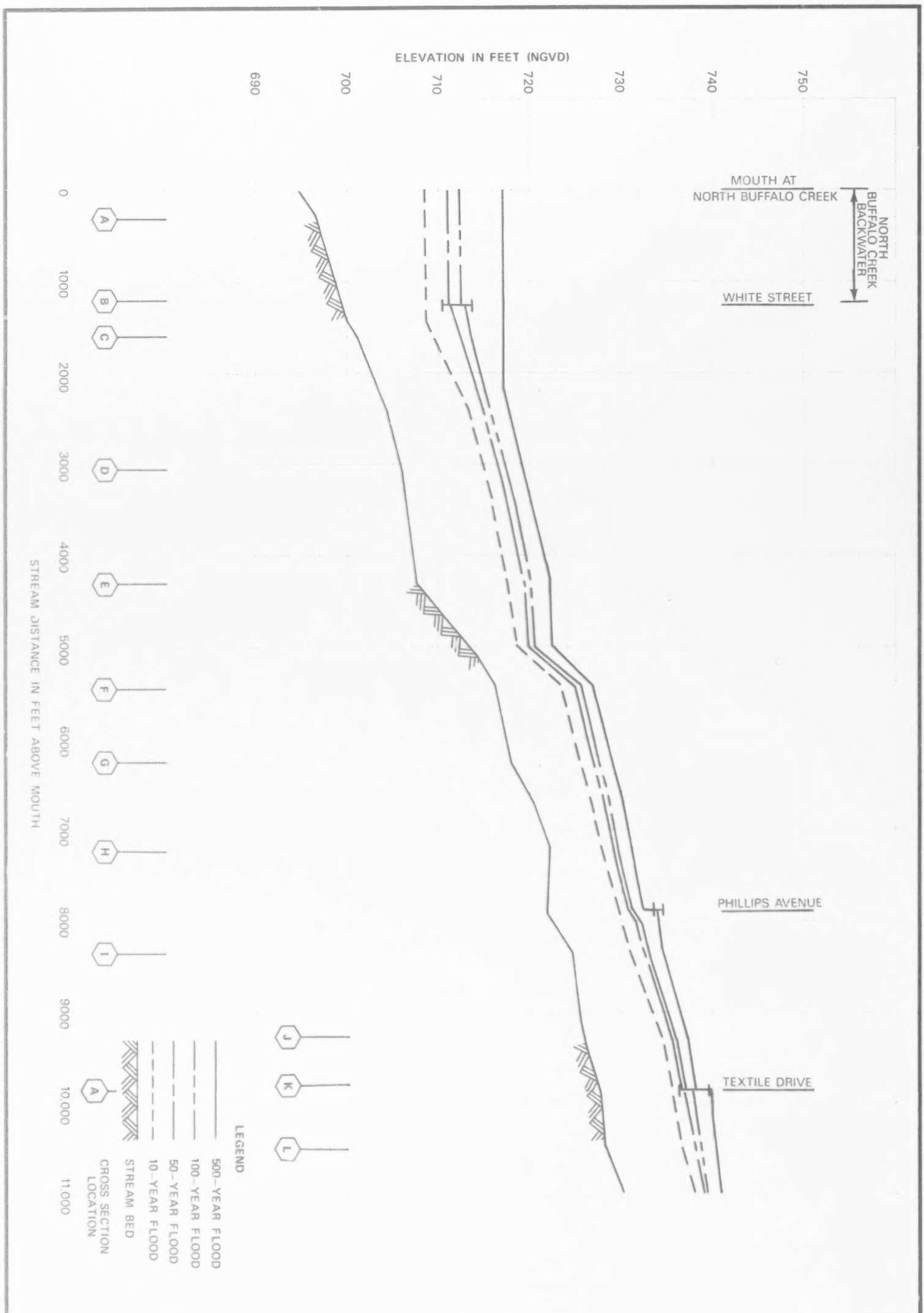
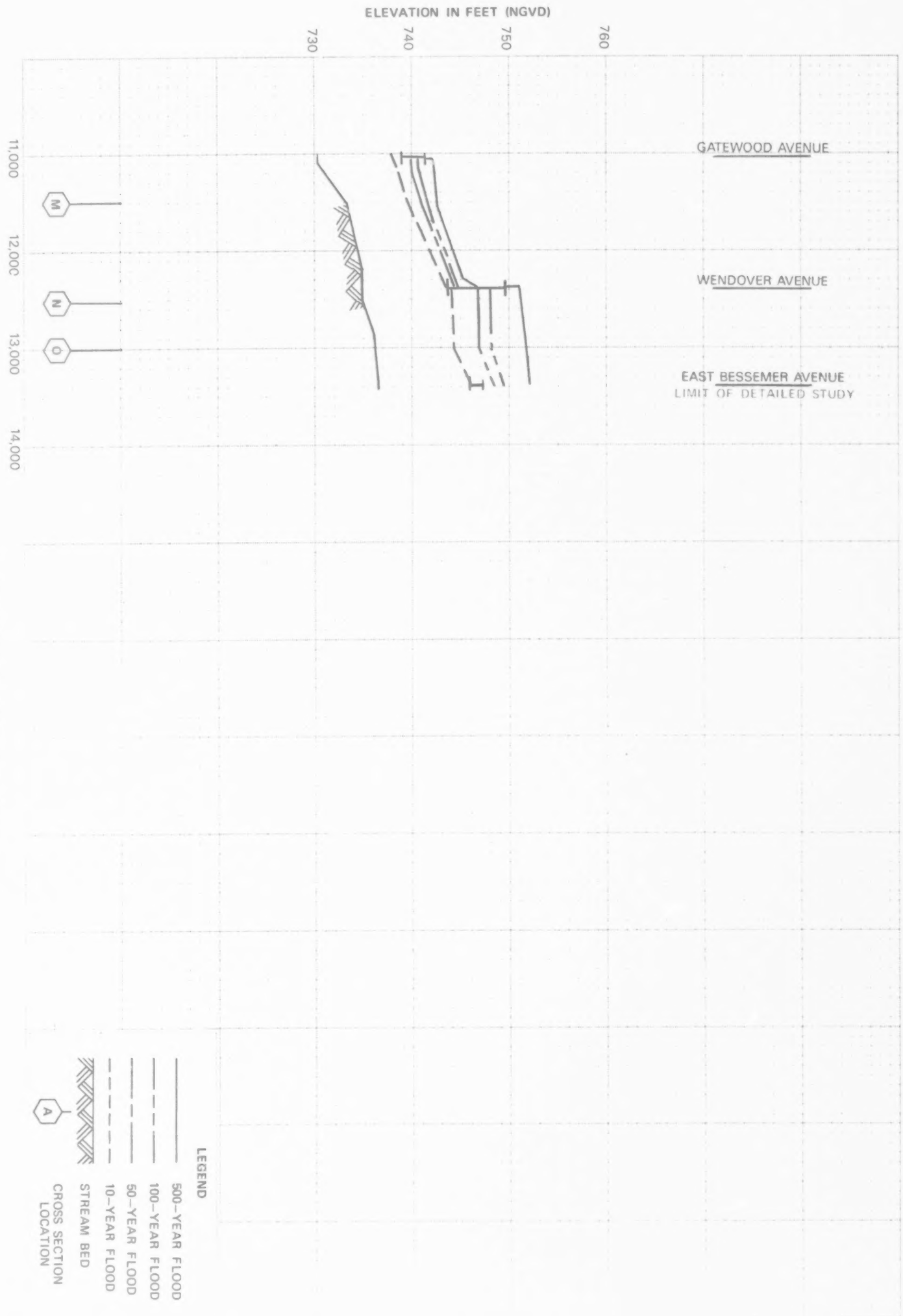


14P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF GREENSBORO, NC (GUILFOPD CO.)	FLOOD PROFILES EAST FORK DEEP RIVER



15P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF GREENSBORO, NC (GUILFORD CO.)	FLOOD PROFILES MUDDY CREEK



16P

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

FLOOD PROFILES

MUDDY CREEK

FLOOD PROFILES

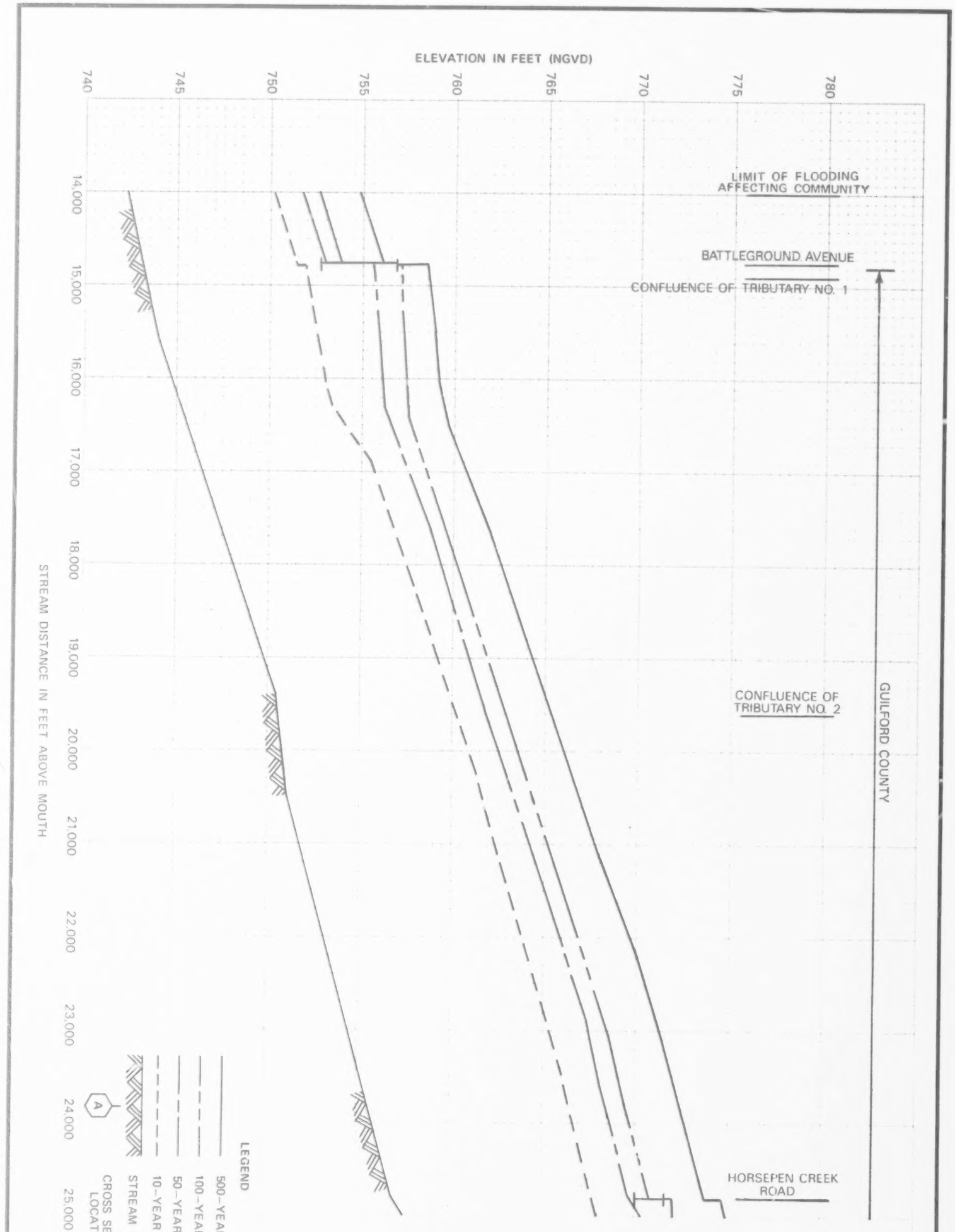
TWIN LAKES TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

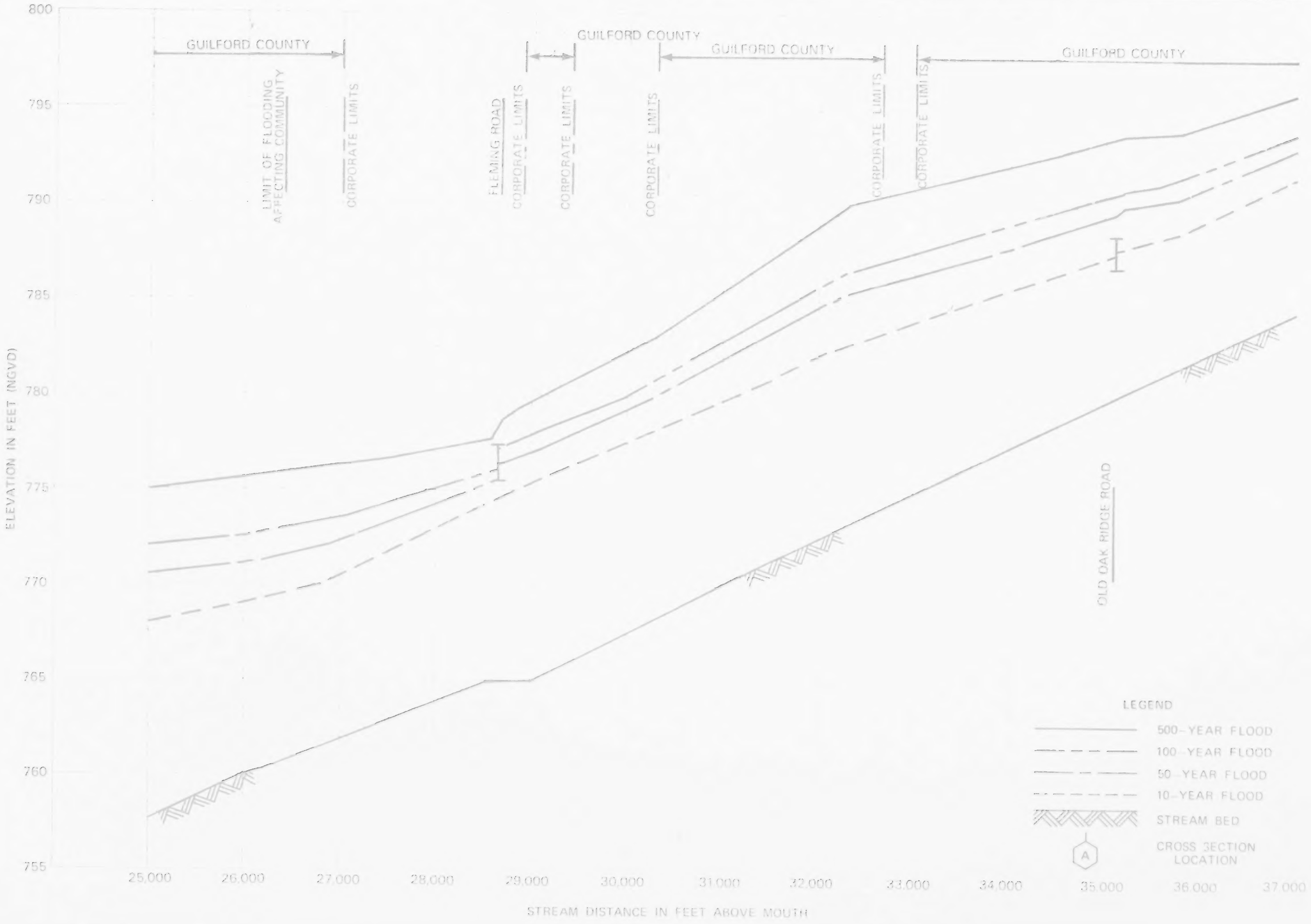
CITY OF GREENSBORO, NC

(GUILFORD CO.)

17P



18P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF GREENSBORO, NC (GUILFORD CO.)	FLOOD PROFILES HORSEPEN CREEK



FLOOD PROFILES

HORSEPEN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFOPD CO.)

19P

FLOOD PROFILES

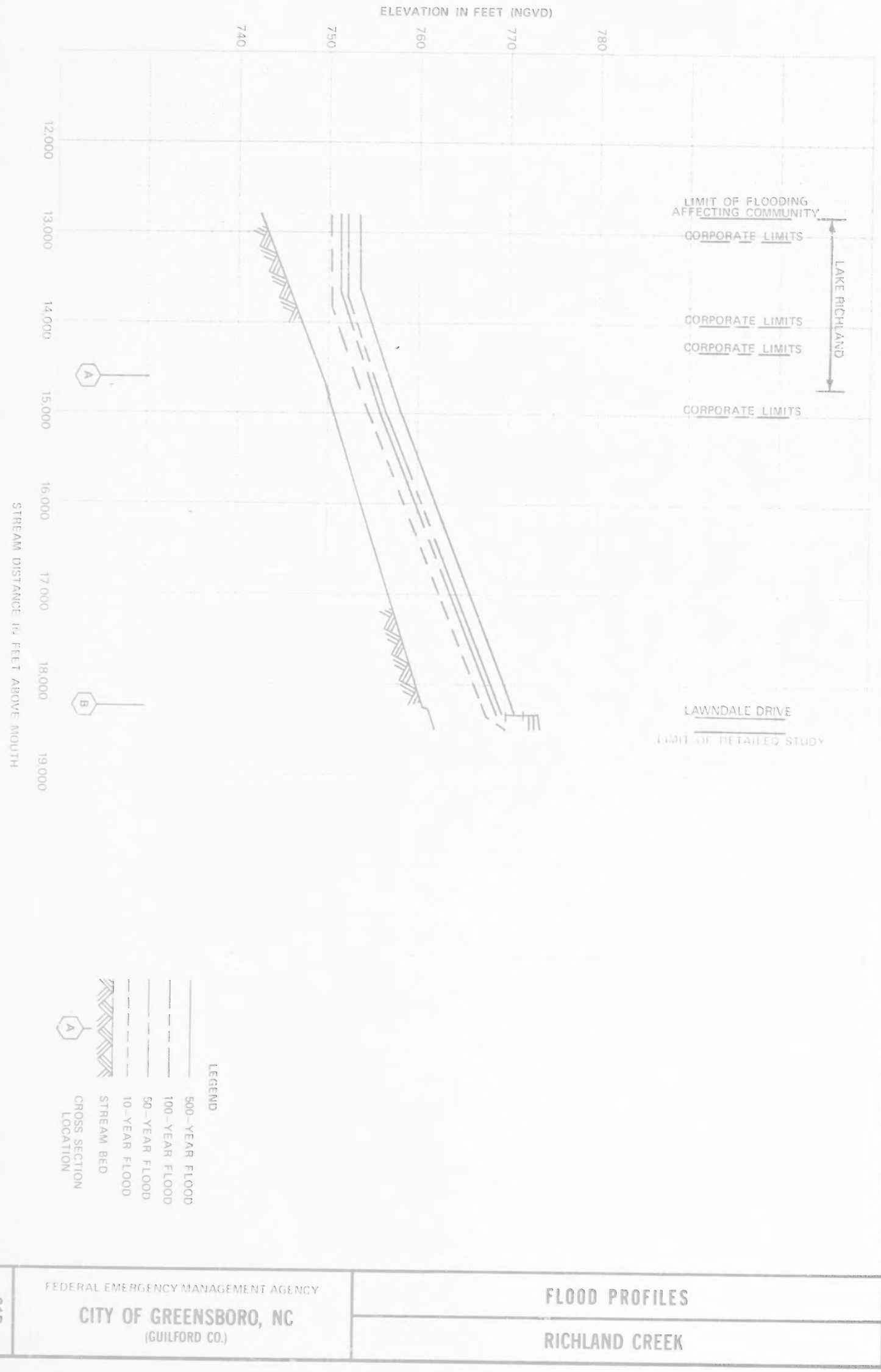
HORSEPEN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

20P



21P

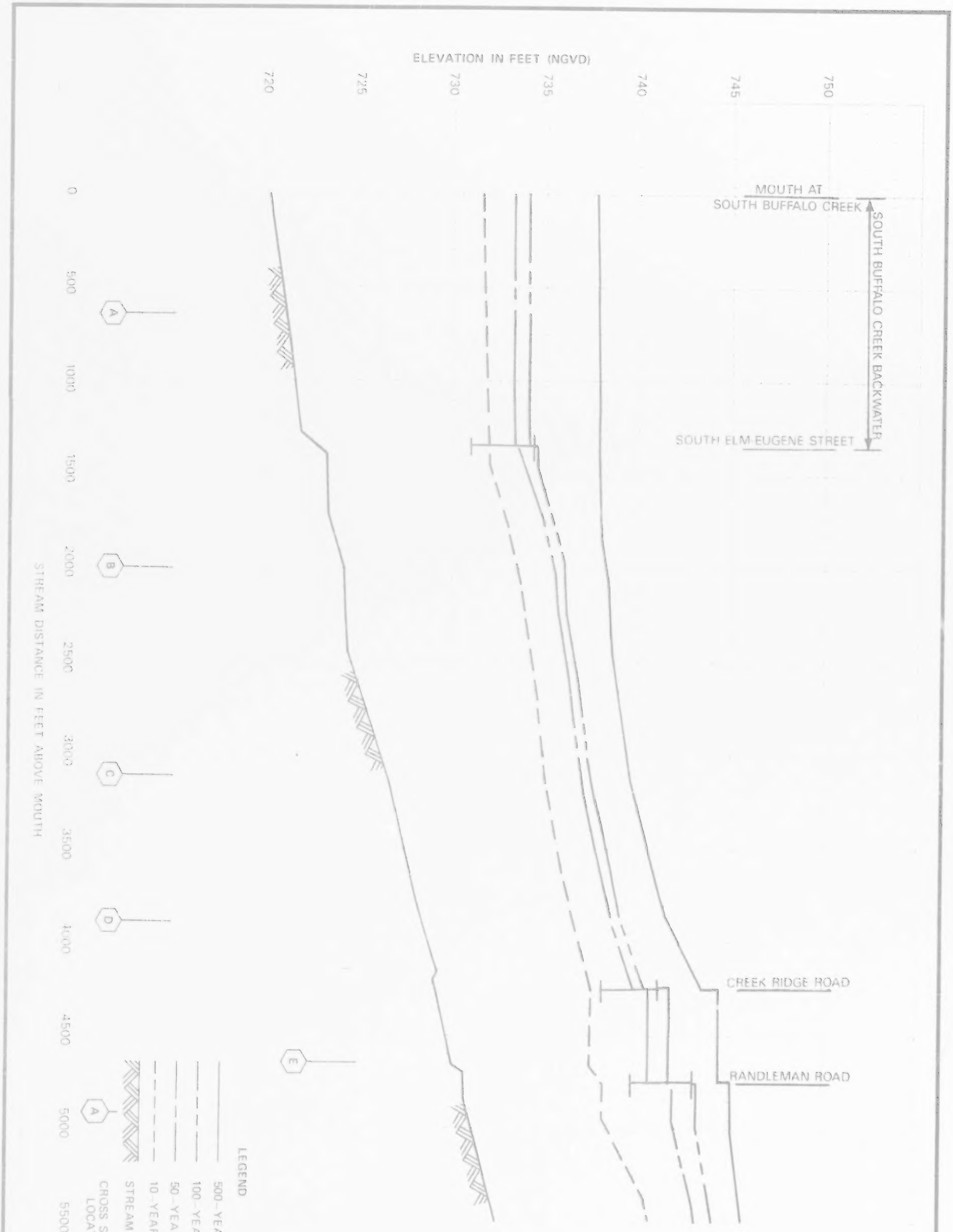
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

FLOOD PROFILES

RICHLAND CREEK



22P

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

FLOOD PROFILES

RYAN CREEK

FLOOD PROFILES

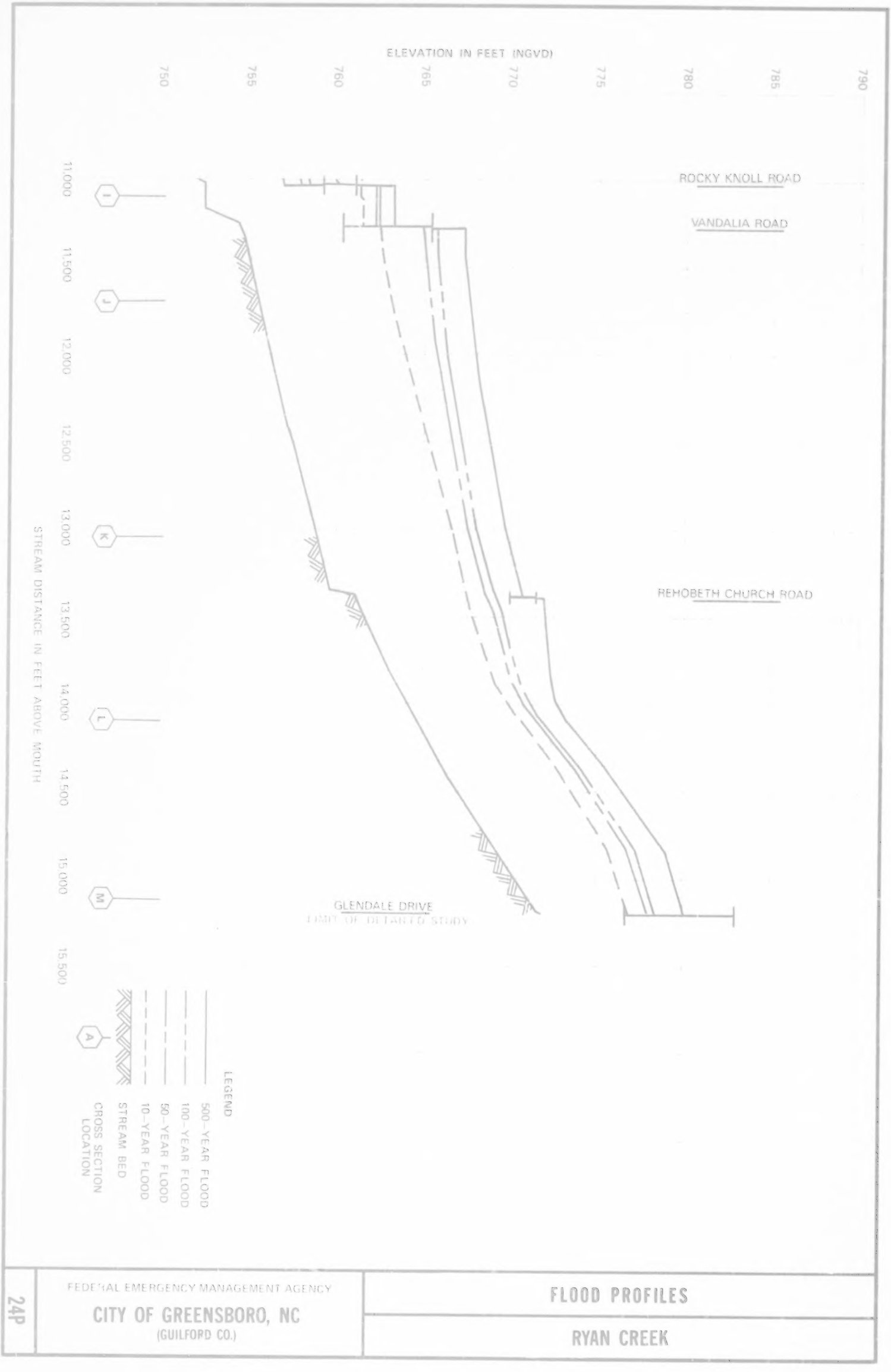
RYAN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

23P



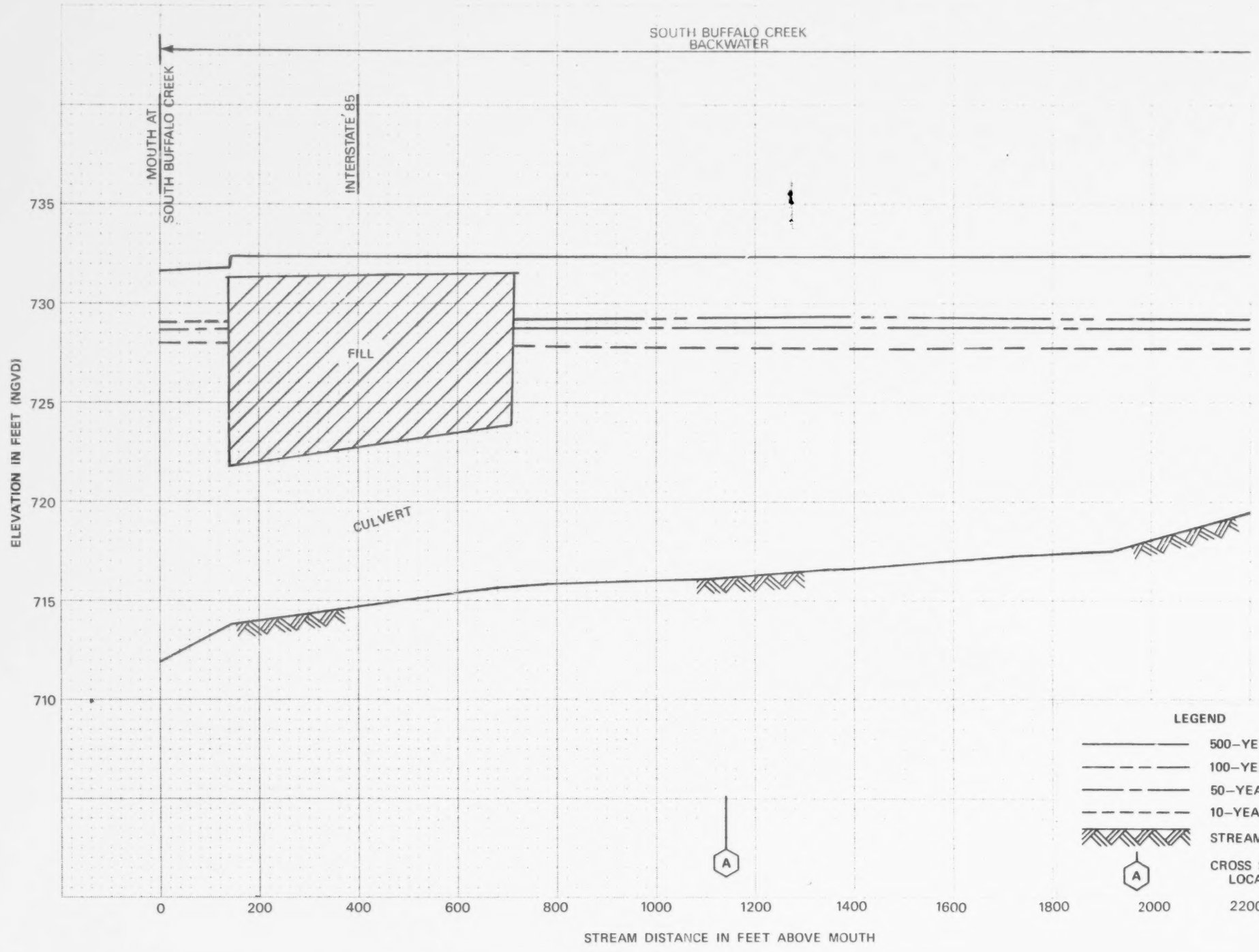
24P

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

FLOOD PROFILES

RYAN CREEK



FLOOD PROFILES

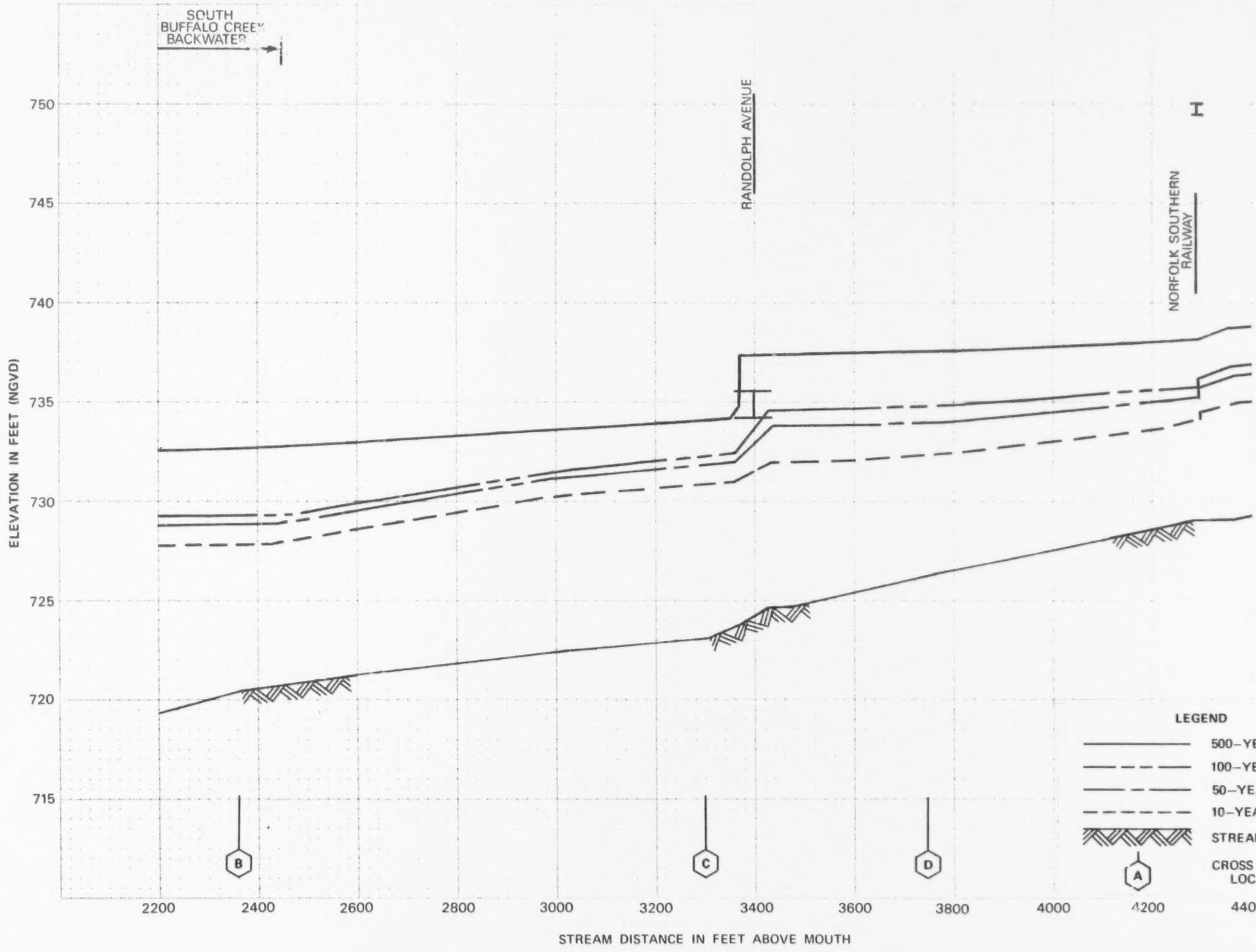
MILE RUN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

25P

55



FLOOD PROFILES

MILE RUN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFOPD CO.)

26P

FLOOD PROFILES

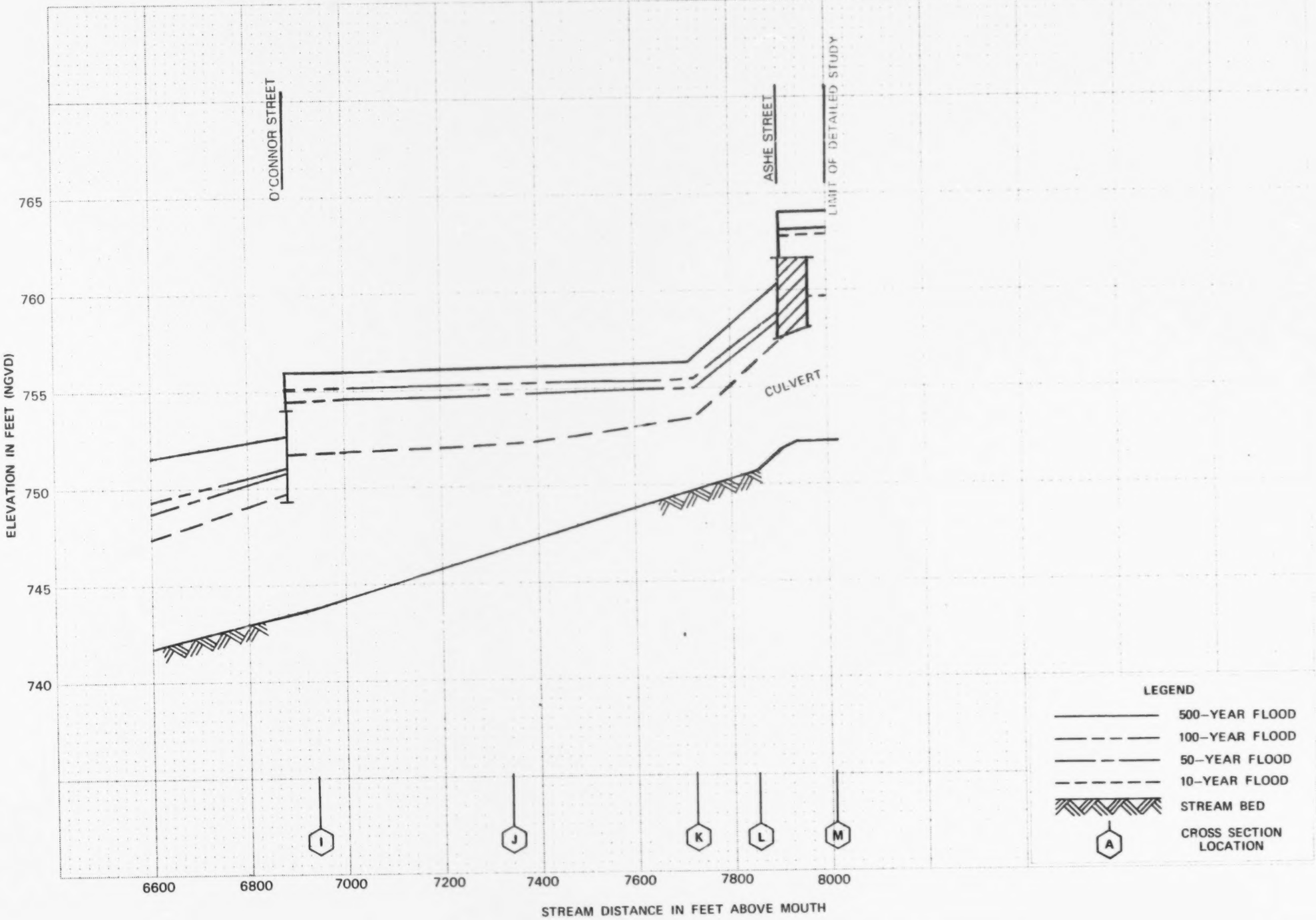
MILE RUN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC

(GUILFORD CO.)

27P



FLOOD PROFILES

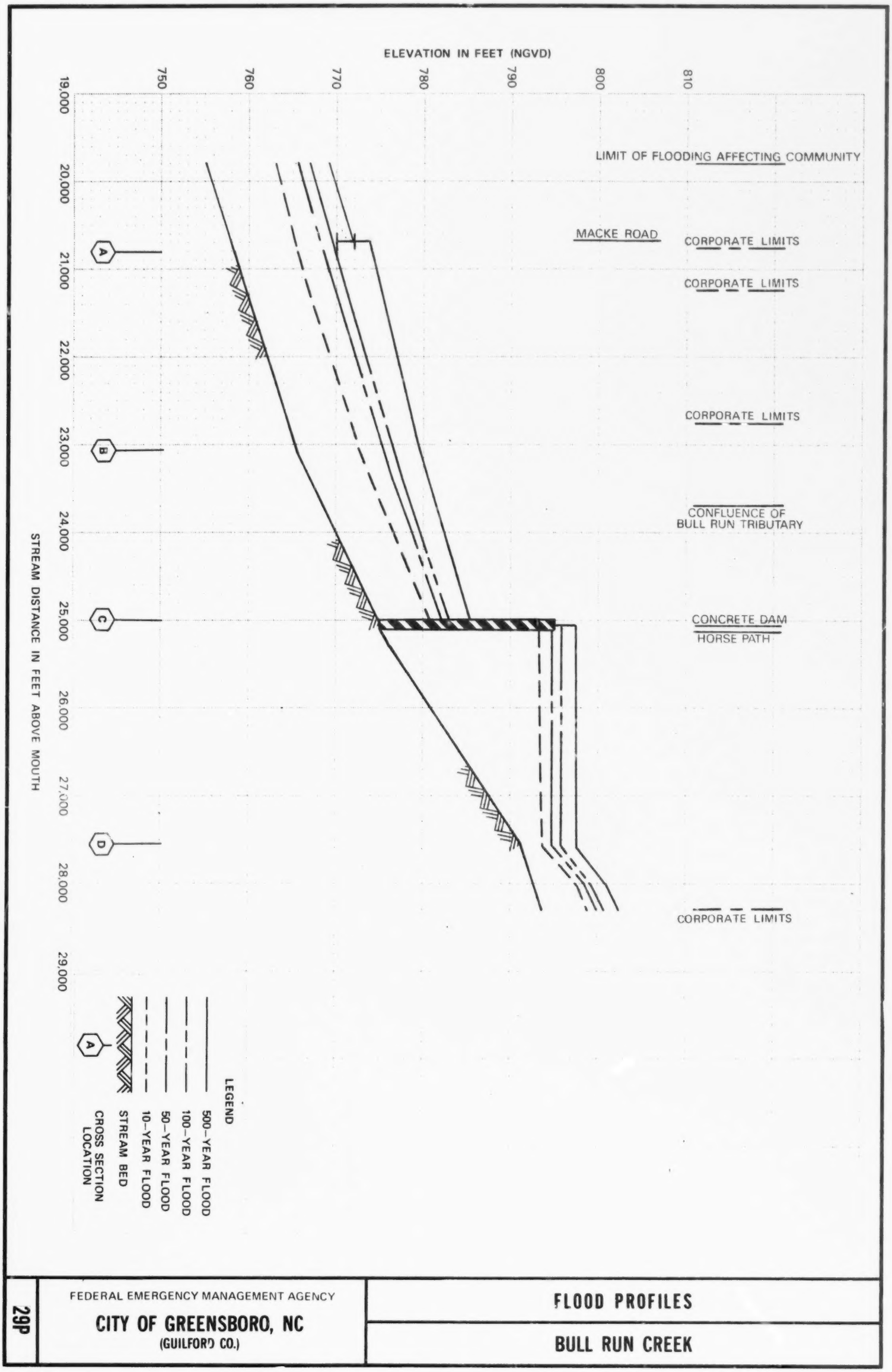
MILE RUN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

28P

5-8



29P	FEDERAL EMERGENCY MANAGEMENT AGENCY **CITY OF GREENSBORO, NC** (GUILFORD CO.)	**FLOOD PROFILES** **BULL RUN CREEK**

FLOOD PROFILES

BULL RUN CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREENSBORO, NC
(GUILFORD CO.)

30P